

iPads in Schools: Use Testing.

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Abstract

The *iPad*¹ was released to the Australian market in May 2010 and this study explored its suitability as a tool for learning in schools. Eight primary and three secondary school teachers were each given two *iPads* and \$100 iTunes credit for a school term and asked to explore six related focus areas including the learning settings best supported by the *iPad*, learning affordances of the *iPad*, student engagement, use with students with learning difficulties, the educational value of Apps and any technical or administrative issues encountered in the management of *iPads* in schools.

The study used a multiple-site case study approach to gather data about the sites of use. Despite some methodological challenges, the pilot found that the *iPad* is a significant tool to support and enhance student learning. It shows extensive affordances as a learning tool (due in part to its portability and fit-for-task suitability) especially in relation to the development of Critical Thinking, Problem Solving, Decision-Making, Research and Information Fluency.

Keywords: iPad, Apps, technology, learning, teaching.

1.0 Introduction

There is little doubt that the hype surrounding the release of Apple's *iPad* was a masterstroke of fetishising an object for improving market capital (Farahmandpur, 2004). "The best way to experience the web, email, photos and video. Hands down" and "It's hard to believe we could fit so many ideas into something so thin" resulted in "Apple Sells Three Million *iPads* in 80 Days" (Apple P/L, 2010a). The *iPad* was released to the Australian market on May 28, 2010 - "FANS rush stores and hyped Apple workers go wild as the *iPad* goes on sale and looks set to sell out in some shops" (Herald Sun, 2010). Postman (1998) pointed out that of course "winners" (technology companies) will always enthuse about their new product and encourage consumers to enthuse about it as well. Apple P/L (2010b) also enthuses about *iPad* 'Apps' because "Kids think it's a game. Parents think it's educational. Everybody wins". This *iPad* pilot set out to determine if the hype matched educational purpose when using *iPads* for learning in schools.

There is a demand for research (Chan et al, 2006) that tells the stories of rich pedagogical practices (Roschelle, 2003) rather than stories about technologies in schools that have been domesticated to the demands of existing curriculum (Salomon, 2000). Though computer technologies continue to follow Moore's Law (computing capacity gets cheaper, better and faster every 18 months), it is only the transformational manner in which it supports learning that is relevant for teachers. Some of the pedagogical advantages of handheld wireless devices have been well documented and include portability, customization of individual learning paths (Chan et al, 2006), social interactivity and relationship building (Rowan & Bigum, 2004).

This pilot used a research design consistent with a qualitative case-study-like approach by recording narratives about pedagogical practices in a number of Catholic schools in Western Sydney. Though anathema to the experimental designs advocated by the 'No Child Left Behind' legislation in the USA (Overbay et al, 2006), the design of this pilot allowed observations to be made about re-defined learning rather than pre-defined learning difference – the latter typified by the question "Is learning better with technology than without?" Bourdieu & Wacquant (1992) remind us to beware of the fetishism of 'evidence' and that "...observation of reality puts us on our guard against the temptation to construct over-simple data models...."

Re-defined learning is not about the technology at all as "... (it)... is not a mechanism that enables constructivism – it is... best used at the moment when it enables students to gain deeper understanding. Technology-as-tool... is the implication" (Judson, 2006). Learners are able to confront new information with their incomplete knowledge

¹ This study used the first version of the *iPad*. The *iPad 2* has since been released in March, 2011.

(Kommers, 2003) and be guided by the technological-pedagogical-content knowledge of the teacher (Pierson, 2000). The ISTE.Nets (2007) Standards provide guidelines for the use of technologies in 21st century learning and were used in this pilot as external benchmarks for student learning.

The *iPad* is a new device and this study sought to test its affordances in ‘redefined learning’ using “Apps” to support learning. The study used a *wePad*² design to test classroom affordances for multiple users.

2.0 Method

The pilot was a multiple-setting case study of the *iPad* as an object to support student learning (Wiersma, 2000, p. 206). The purpose of the pilot was to explore the use of *iPads* in classroom settings in Catholic primary and secondary school sites in Sydney. Participants in each setting were asked to self-report their experiences through pedagogical stories using video or presentation software, as well as to respond to personal interview questions and surveys. Two *iPads* were made available at each site with free wireless Internet connectivity and \$100 credit with the *Apple iTunes* Store for the purchase of *Apps* to support student learning. *Apps* is a term used by *Apple* to refer to ‘application software’ which can range from something as simple as a single touch link to a website, through to something as complex as a discrete, self-contained piece of programming which promotes user interactivity for knowledge production.

The over-arching framework (Figure 1) of the study involved a funnel approach (Wiersma, 2000, p. 209) which took general questions and ideas through an iterative process to collect data and make comparisons. This allowed the study to focus specifically on the way an object might be said to interact with a context (Bourdieu & Wacquant, 1992) – in this study, the *iPad* (object) is used in the classroom for student learning (context).

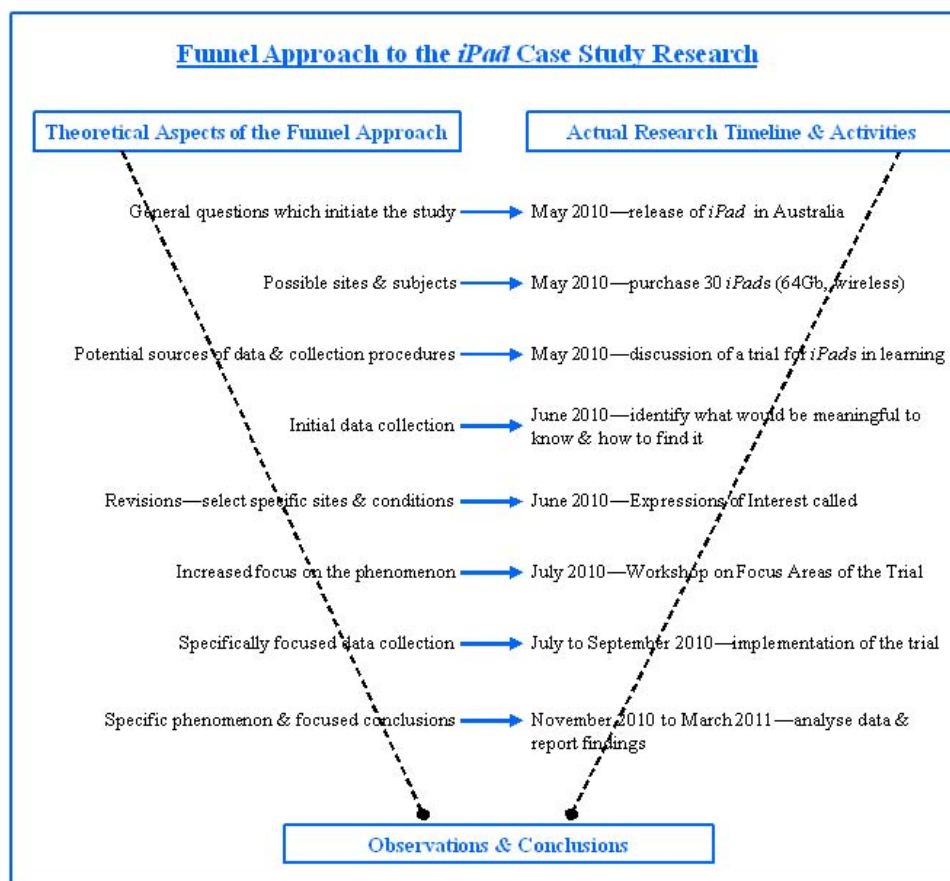


Figure 1: Theoretical aspects of the Funnel Approach used in this *iPad* Case Study.

The pilot was planned and implemented during two school terms in 2010 with site selection made through a competitive *Expression of Interest* (EOI) process initiated two weeks prior to the implementation term. The EOI was sent to all school principals asking for teachers who could demonstrate that they had been ‘innovative’ in

² The *iPad* is designed as an ‘i’ device ie. single owner and user, however this study used it as a *wePad* ie. multiple ‘owners’ and users. This design is explored in detail in section 5.7.

their teaching over the previous twelve months. The term *innovative* (in this pilot) means having used technologies in the support of student learning.

Ten primary schools and five secondary schools were initially selected with eight primary and three secondary schools completing the pilot. Their site profiles are shown in Table 3. A three-hour orientation workshop was held in week 1 of the implementation period to outline the Focus Areas of the pilot (Table 1) and to collect information from the teachers about their proposed learning uses of the iPads.

The remainder of the workshop dealt with technical and administrative aspects of the pilot including participant responsibilities, completing the online pre-pilot survey, distributing and demonstrating some uses of the iPads and discussing potential technical issues eg. sync'ing iPads to an iTunes account. In the first two weeks of the implementation period following the meeting, schools decided how they would use the iPads to support learning and this is shown in Table 3.

Six Focus Areas were identified and subjectively aligned with the Student Standards of ISTE.Nets (shown in full in Appendix 1). This alignment is shown in Table 1. Feyerabend's *Principle of Counterinduction* states that an object in customary use cannot be 'discovered' from within but needs an external comparative measure to provide an alternative set of assumptions (Crotty, 1998, p. 41). The ISTE.Nets Standards provided an accepted external set of high performance technology uses to determine the quality of student learning settings and activities best supported by the iPad. The Standards provide "...a compendium of skills required ... to be competitive and successful in a global and digital world" (ISTE.Nets, 2007).

Focus Areas (FA)	Student Standard (SS)					
1. Learning settings	SS1	SS2	SS3	SS4	SS5	SS6
2. Learning affordances	SS1	SS2	SS3	SS4	SS5	SS6
3. Student engagement	SS1	SS2	SS3	SS4	SS5	SS6
4. Students with learning difficulties	SS1	SS2	SS3	SS4	SS5	SS6
5. Educational value of Apps	SS1	SS2	SS3	SS4	SS5	SS6
6. Technical or administrative issues	SS1	SS2	SS3	SS4	SS5	SS6

Table 1: Focus areas aligned with the applicable Student Standards from ISTE.Nets³ are shown as shaded cells.

The pilot was implemented in Term 3 of the school year and concluded with a second three-hour workshop where each school:

- reported their learnings with a prepared presentation;
- completed the online post-pilot survey; and
- returned the iPads.

The data sources for the pilot are shown in Table 2. Each Focus Area (except FA6) was supported by a minimum of three data sources to ensure multiple points of view. Post-pilot, the ISTE.Nets Student Standards⁴ were used to code each of the data sets by selecting the most common uses of the iPads and matching them to the relevant standards.

³ Codes shown in the Standards are detailed in Appendix 1.

⁴ The full text of the teacher and student ISTE.Nets Standards is shown in Appendix 1.

Data Set	Type	Details	Collected	Focus Area (FA) ⁶
1	Self-reported surveys	Shown in Appendices 6 and 7. These instruments are divided into sections to elicit data specifically related to the focus areas of the pilot: Section 1: Demographic Information Section 2: Classroom practices Section 3: Skills Section 4: Sustainability of Practice.	Week 1 pre-pilot survey Week 10 post-pilot survey	FA1-4
2	Self-reported presentation	Individual site reports of the use of the iPads in each of the 6 focus areas of the pilot.	Week 10	FA1-6
3	iPad Apps used	<ul style="list-style-type: none"> • number of Apps downloaded • learning uses • self-reported reviews of the App for the specific learning context. 	Week 10	FA2 FA5
4	Post-pilot interviews	Individual interviews with randomly selected teacher participants using the following questions: 1. What did you learn about the use of mobile devices for student learning? 2. Were the learners any more engaged, creative or innovative compared to non-use? 3. For what purposes were the Apps chosen? 4. If every student had an iPad, what would learning be like?	3 weeks after the pilot	FA1-5
5	Blog	A shared practice area for discussion questions, sharing ideas and project management. http://learningwithipads.blogspot.com	On-going throughout & beyond the pilot	FA1-6
Table 2: Data sets and Focus Areas (FA) of the pilot.				

Data source 1 was the self-reported pre- and post-pilot surveys for which an on-line tool was used (*SurveyMonkey*⁵). The tool allowed organisers to assign a set period for the survey to be completed as well as obtain instant graphing and collation of results. The blank surveys are shown in Appendices 6 and 7.

Data source 2 was the end-of-pilot presentation from each site in a form chosen by the school to best represent the work done. Formats included videos, photographs, and slideshows using presentation software and paper handouts. Schools were asked to report on the six Focus Areas of the pilot.

Data source 3 was the *Apps* used by each site which were grouped according to curriculum area. This list was prepared from information provided by the participants and shown in Appendix 2. Sites were asked to monitor the use of the *Apps* that were downloaded (free and paid) and write a review of their application for learning.

Data source 4 was a post-pilot interview. Three randomly selected sites were asked to respond to questions about Focus Areas one to five (Table 7). This was a chance for participants to reflect on their learnings in a more informal way, as they could provide feedback against the questions, but also any other aspect of the pilot. The interviews were conducted and recorded by same person each time, with written questions provided prior to recording.

Data source 5 was the blog. This supported the administrative and learning functions of the pilot and was designed as a sustainable resource post-pilot. All participants were required to contribute to the blog at least three times over the ten week implementation period by commenting on their own work, the work of others or to provide general comments about learning with iPads.

⁵ See <http://www.surveymonkey.com>

⁶ From Table 1

There was no in-school support or training workshops provided for the pilot participants and all communications during the pilot were made by email, phone or through the blog. Sites were expected to proceed with their self-styled projects and to contribute to the blog to let others know what they were doing. Each school project was expected to explore all six of the Focus Areas.

3.0 Results

Eight primary and three secondary school sites completed all surveys and reported on their work. Table 3 shows their demographic information and a summary of their project activities.

Data set 3 was the *Apps* used and are shown with reviews and usage reports in Appendix 2. Table 4 summarizes these Apps and their major learning uses by Curriculum Area.

The typical Major Learning Uses and Curriculum Areas were aggregated into Major Project Activities (MPAs) and then matched to the ISTE.Nets Student Standards (Appendix 1) in order to identify the frequency of *iPad* use contributing to achievement of the Standards. The self-reported pre-pilot and post-pilot surveys were used to establish the predicted and actual frequencies of *iPad* use in each MPA and are shown in Table 5.

MPAs contributed to more than one Standard and to determine those Standards most likely to be supported through *iPad* usage, each MPA was then mapped to individual Student Standards as shown in Table 6 and Figure 2. The table also shows which of the identified Focus Areas of the pilot were explored through student engagement with the MPAs.

Site	Type ⁷	Year	Subject Areas	Project Activities
A	P	6	Special Needs, English, Languages, HSIE ⁸	Special Needs – spelling, word understanding, revising mathematical concepts. ESL – revision of basic concepts and communication of ideas. HSIE – human body investigation using 3D body app.
D	P	3-6	Special Needs	Literacy – reading, spelling and phonics.
G	P	5-6	Mathematics, Literacy, Integrated lessons	Mathematics – for times tables and fractions. Literacy – spelling, phonics, reading books. Integrated lessons – menu board groups and personal research.
I	P	3	Literacy, Mathematics & HSIE	Mathematics – Maps and Calendar. Literacy – groups, menu board activities. HSIE – personal research.
J	P	2	Mathematics, Literacy Groups, HSIE, ESL	Literacy – phonics, oral language skills. Special Needs - write and draw sight words, letter formation, handwriting and spelling. HSIE – personal research.
K	P	K	Literacy, Mathematics, Music	Literacy – reading, sight words, phonics, writing stories. Mathematics – rote practice. Music – created own music.
N	P	6	Multimedia English, Special Needs Mathematics	English – created media projects using Teleprompter. Special Needs –high need support children for literacy and mathematics to reinforce number operations and sight words.
O	P	3-4	Music, Literacy	Music – recording music class, using Apps to create and record scripts into teleprompting for making movies. Literacy – shared reading, visual literacy and research.
C	S	7-10	English, Special Needs, HSIE	English – visual text for year 10 and spelling in years 7-8. Special Needs – literacy basics and using PDF textbooks Geography and Science research.
F	S	7	Connected Learning ⁹ , Mathematics,	D&T – file-sharing, music recording Apps English – e-books in silent reading. Mathematics – expand on formulas.

⁷ P = Primary; S = Secondary

⁸ Human Society and its Environment

⁹ Connected Learning is an integrated study of Religious Education, English and HSIE.

			Design & Technology D&T	Connected Learning – research.
M	S	7	Music	Music – concepts and theory, identifying instruments and their history, assessment of singing and playing.

Table 3: Case study sites, profiles and projects – Data Sets 1 (section 1) and 2.

Curriculum Area	Number of Apps	Typical Learning Uses Across all Apps
English	75	<ul style="list-style-type: none"> • Content creation eg. great tool for play-building and narrative writing, constructing meaning from text, sequencing • Virtual learning with Apps eg. phonetic awareness, phonics, vocabulary, identifying cause and effect, identifying fact and opinion, identifying point of view and purpose, finding similarities/differences • Reading eg. digital storybooks, e-books • Whole of class eg. teacher demonstration of an App • Personal study eg. comprehension skills practice, games, reward time • Communication, collaboration and presentation eg. retelling stories, small group sessions like MenuBoard
Mathematics	43	<ul style="list-style-type: none"> • Communication, collaboration and presentation eg. warm-up activity, small group sessions like MenuBoard • Virtual learning with Apps eg. maths calculator simulations, word puzzles • Whole of class eg. interactive whiteboard demonstration • Personal study eg. quizzes, games, reward time • Access information eg. spatial awareness Apps
Integrated Studies	41	<ul style="list-style-type: none"> • Virtual learning with Apps eg. planning excursions, using timetables, writing text in another language and having it translated and spoken • Personal study eg. note-taking, individual work • Access information eg. reference encyclopaedia, research • Reading eg. books for research • Content creation eg. writing paragraphs about what was learnt • Communication, collaboration and presentation eg. presenting work to class by network and interactive whiteboard • Whole of class eg. teacher demonstration of Apps
Creative Arts and Digital Media	43	<ul style="list-style-type: none"> • Content creation eg. composing music, drawing • Communication, collaboration and presentation eg. singing karaoke-style to small group audiences • Whole of class eg. interactive whiteboard demonstration • Personal study eg. games, reward time • Virtual learning with Apps eg. piano keyboard on screen

Table 4: Typical major uses of Apps in curriculum areas – Data Set 1 (sections 2 and 3)

Major Project Activity	ISTE.Nets Reference ¹⁰	Predicted Frequency of iPad Use	Actual Frequency of iPad Use
Reading	3, 4	93.8%	100%
Whole of Class	NA ¹¹	93.8	90.9%
Access information	3	87.5%	86.4%
Communication & Collaboration	2, 5, 6	62.5%	63.6%
Virtual learning with Apps	1, 4	62.5%	63.6%
Content creation	1, 4, 5	68.8%	45.5%
Personal study	3-6	54.2%	20.8%

Table 5: The frequencies show the predicted and actual self-reported percentage of use of iPads to achieve the ISTE.Nets Standards in the MPAs eg. 63.6% of participants used the iPads for Virtual Learning with Apps at least once during the pilot period. The derivation of the matching and frequencies is shown in Appendix 3.

ISTE.Nets Student Standards (SS)	MPAs	Focus Areas ¹²	iPad Usage %
SS4 Critical Thinking, Problem Solving, Decision Making	<ul style="list-style-type: none"> Reading Content creation Virtual learning with Apps Personal study 	1-5	27.9%
SS3 Research & Information Fluency	<ul style="list-style-type: none"> Reading Access information Personal study 	1, 2, 4, 5	25.1%
SS5 Digital Citizenship	<ul style="list-style-type: none"> Content creation Personal study Communication 	2, 4, 5	15.8%
SS1 Creativity and Innovation	<ul style="list-style-type: none"> Content creation Virtual learning with Apps 	1-5	13.2%
SS6 Technology Operations & Concepts	<ul style="list-style-type: none"> Personal study Communication 	1, 2, 4, 5, 6	10.3%
SS2 Communication & Collaboration	<ul style="list-style-type: none"> Communication 	1-5	7.7%

Table 6: The ISTE.Nets Student Standards most supported by iPad usage in this pilot. The derivation of these mappings is shown in Appendix 4.

¹⁰ See Appendix 1.

¹¹ Not Applicable - there is no relevant ISTE.Nets Student Standard.

¹² See Table 1.

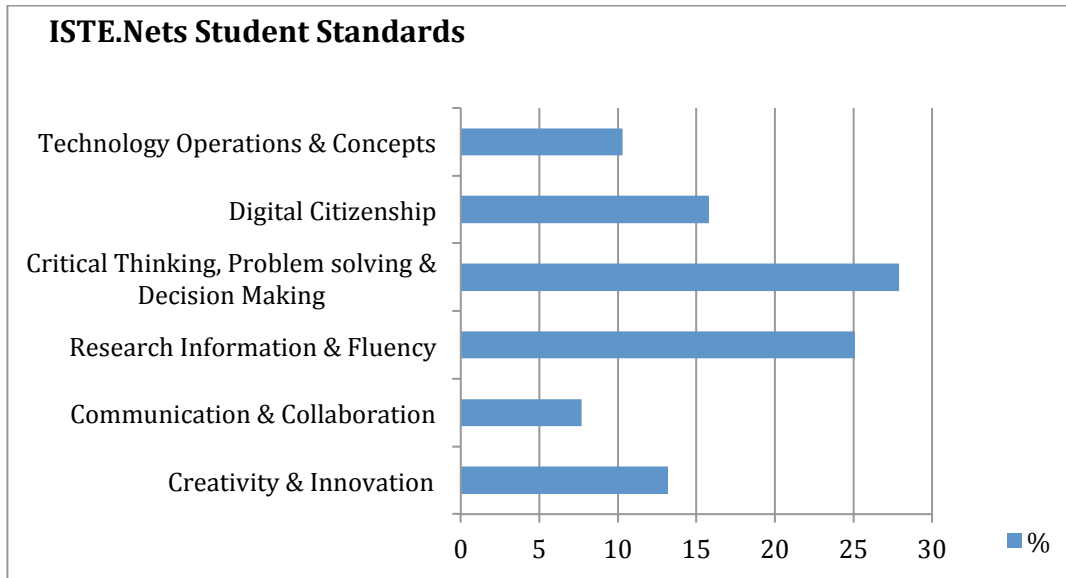


Figure 2: From Table 5, ISTE.Nets Student Standards most supported by the pilot’s iPad usage.

As well as providing opportunities for learning, the pilot had some challenges for participants as shown in Figure 3. The predicted challenges (as shown on the pre-pilot survey) were not always the actual challenges (post-pilot survey) experienced in the pilot.

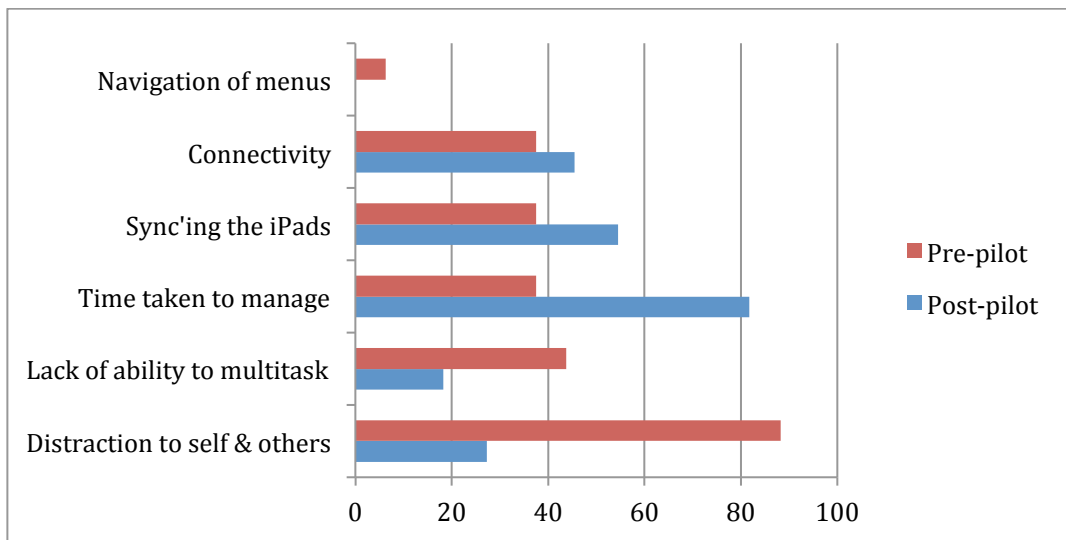


Figure 3: Pre-pilot and post-pilot challenges in iPad use in the classroom. Also shown in table form in Appendix 5.

Post-pilot interviews (Data Set 4) were conducted with contacts from three randomly selected pilot sites. Responses were recorded against each of the four questions and a summary is shown in Table 7.

Figures 4, 5 and 6 show teacher responses to survey questions about skills and sustainability (Data Set 1, sections 3 and 4).

Interview Question	Responses
What did you learn about the use of mobile devices for student learning?	<p>“The iPad was definitely mobile and flexible in use”</p> <p>“Light to carry ... for Kinder students”</p> <p>“Easier to use than a laptop with the touch-screen”</p> <p>“Colourful”</p> <p>“Easily connected wirelessly”</p> <p>“Easy to navigate”</p>
Were the learners any more engaged, creative or innovative compared to non-use?	<p>“Children were engaged through the use – especially boys”</p> <p>“Creativity and innovation depended on the Apps in use – several of the Apps allowed for differentiated use so that children could work at their own ability level (especially kept slower readers interested)”</p> <p>“Gaming levels in many Apps were excellent for competition and motivation”</p>
For what purposes were the Apps chosen?	<p>“Games were chosen for children’s interests and for their relation to class activities”</p> <p>“Mostly for literacy and maths”</p> <p>“Selected Apps for use in literacy groups and also for how they related to relevant syllabus outcomes”</p> <p>“Used e-books the least eg. <i>Stanza</i> as they only supplied static and out-of-print books and no textbooks”</p> <p>“Very little Australian content”</p> <p>“Used to reinforce maths concepts”</p>
If every student had an iPad, what would learning be like?	<p>“School bag size would be smaller as they would not need to carry so many textbooks”</p> <p>“Provide access to experiences not available elsewhere”</p> <p>“Instant differentiation and reinforcement”</p> <p>“With each child having an iPad, this would challenge teachers to cater for a different way of learning”</p>

Table 7: Post-pilot interviews with randomly selected sites – Data Set 4.

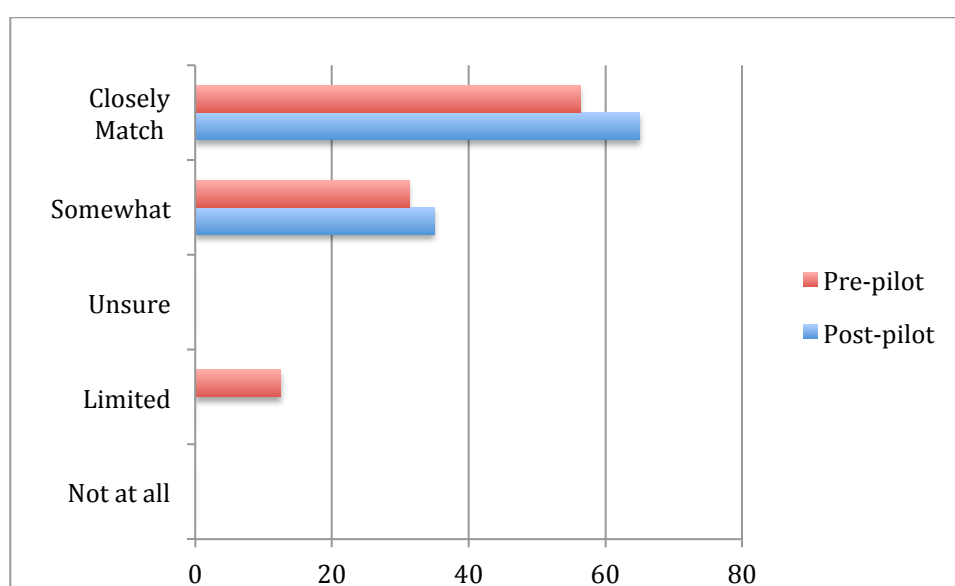


Figure 4: Self-reporting of the extent to which teachers' skill level in the use of technologies-for-learning match student learning demands.

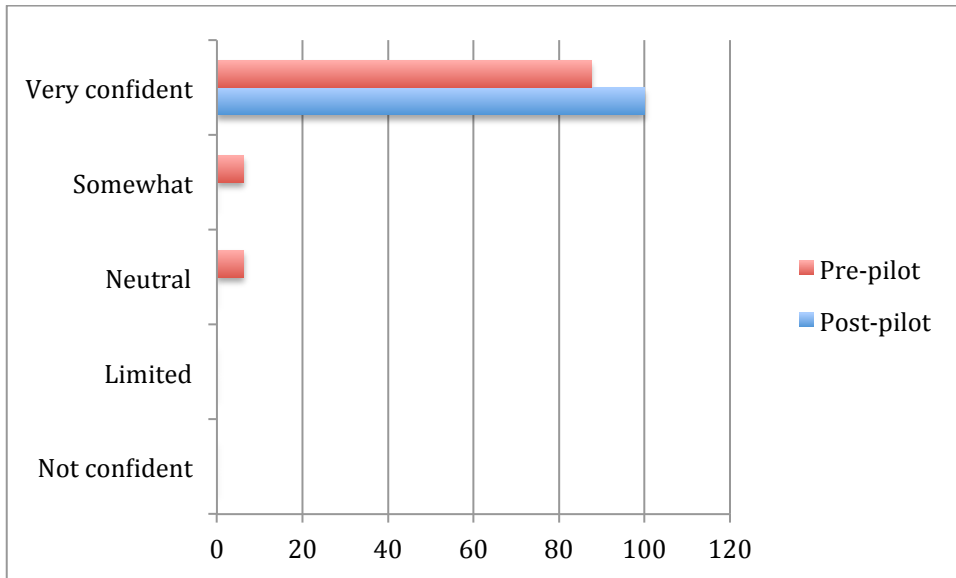


Figure 5: Self-reporting of the extent to which teachers believe that using technologies makes a positive difference to learning.

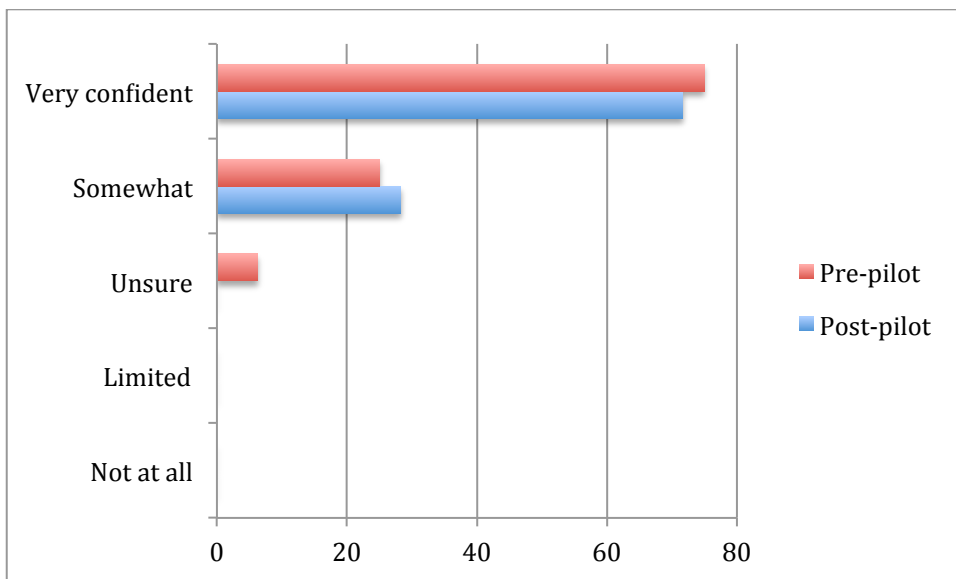


Figure 6: Self-reporting of the extent to which teachers believe they are confident in using their learning about technologies to enhance and improve learning experiences with their students.

4.0 Discussion

The purpose of the pilot was to classroom-test the use of two *iPads* in a range of teaching and learning contexts over the period of a school term. The testing involved making observations against the six focus areas of:

1. Learning settings
2. Learning affordances
3. Student engagement
4. Students with learning difficulties
5. Educational value of *Apps*
6. Technical or administrative issues.

4.1 Methodology

Initially, the pilot was designed to be no more than a simple arrangement of loaning *iPads* to teachers who would self-report the learning uses to which they were put. However to provide insights around the specific focus areas, a more structured approach was required involving some rearrangement of ideas after the pilot was underway. Some of the methodological challenges are outlined below and these present some validity and reliability caveats when drawing conclusions from the pilot.

The research approach was that of a case study with multiple settings ie. the same questions were being asked of the same object at multiple sites. This is a common form of qualitative study involving the development of a narrative about the settings which is descriptive of the local uses of the object (*iPad*) with results being specific to the setting ie. not generalizable to other settings. The applicability of the findings to other settings will depend on the reader deciding whether enough similarities can be drawn to their own settings for the findings to apply.

Such was the vast array of data collected, it was decided post-pilot to use the ISTE.Nets standards to provide an external benchmark through which to determine whether the learning uses to which the *iPads* were put in the classrooms were of significant educational value. The term ‘significant educational value’ is taken to mean those aspects of technology-use-for- learning elaborated in the Standards in Appendix 1.

A meaningful determination of ‘value’ required some data manipulation to allow a valid comparison between the observed learning uses from the pilot and the types of learning outlined in the ISTE.Nets Standards. This involved categorising the observed typical learning activities (Table 4) into MPA’s (Major Project Activities from Table 5) which were identified in the pre-and post-pilot surveys as being some of the major uses of the *iPad* in learning. These MPA’s were then aligned with the six Student Standards from ISTE.Nets (Table 6).

The categorising (Table 4) and aligning (Table 6) of activities to standards was, necessarily, an arbitrary process due to the late decision to use the ISTE.Nets Standards as the external benchmark. The process was assisted by making an assumption that the survey questions provided discrete data that was collapsible and therefore subject to some mathematical manipulation to yield percentages of *iPad* usage. Two of the many difficulties associated with this assumption are:

1. There seemed to be no common understanding among participants and pilot organisers of the meaning of some of the language used in the surveys and the workshop Focus Area documentation eg. “Content Creation” was determined by some participants to mean only the use of ‘productivity’ *Apps* such as *Notes* or *Evernote* or *Pages*. Other participants took it to also include the populating of templates provided by *Apps* in Mathematics and Music.
2. There were also instances of meaning-overlap in the survey items that meant discrete information may not have been collected eg. “Studying”, “Reading” and “Individual Work” could be thought of by participants as having reasonably similar meanings and all would require “reading” to some degree. But “Reading” stands alone as an MPA while “Studying”, “Individual Work” and “Note-taking” are collapsed together under the MPA called “Personal Study”.

While these issues are significant, it was still possible (at least as a minimum) to use the data to rank the frequency of *iPad* usage across the Standards as shown in Table 6. This ranking was secondarily supported through information gathered in data sets 2, 3 and 4 which showed that the rankings achieved through survey calculation had some validity eg. interview question 3 of data set 4 (Table 7) and the *Apps* shown in data set 3 (Appendix 2) show clearly that “Critical Thinking, Problem Solving and Decision Making” is the most commonly defined purpose of use of the *iPad* while “Communication and Collaboration” was mentioned only rarely.

Further challenges emerged as the pilot progressed.

1. 'Classroom observation' was not used as a data set in this study as it was felt that, consistent with the *Uncertainty Principle*¹³, teachers using the new technologies with their classes may have had their teaching affected by having observers in the room. This meant that there was a heavy reliance on self-reported data which had the potential to introduce a lack of triangulation and pose a question over the reliability and validity of the findings. As discussed however, the self-reporting occurred over a number of data sets (surveys, Apps used, interviews, blog and presentation) and the comments about the *iPads* in learning showed a remarkable consistency over the study period.
2. Matching the respondents completing the pre/post pilot surveys was difficult with only 6 out of the original 15 teachers being the same respondent for both surveys and only 11 teachers responding to the final survey as opposed to 16 in the pre-pilot survey. This may have affected the pre/post comparisons made in figures 3-6.
3. There was also a mismatch between pre-pilot workshop attendance and the actual teachers who used the *iPads* in their classrooms. This may have led to a less than clear shared understanding of the pilot requirements by teachers and contributed to misunderstandings and some disengagement from the data collection process.
4. No time was offered to participants to conduct the pilot in their schools which may have led to a lack of considered implementation and reporting in the surveys and the blog. 'Time' was identified by the organisers (pre-pilot) as a possible issue but it was decided not to offer any additional time (eg. release from classes) to teachers in order to properly approximate the normal school routine of classroom learning preparation.
5. Identifying specific Focus Areas may have pre-defined participant behaviours resulting in the creation of artificial activities purely for the purposes of the pilot. This may have meant that the *iPad* was tamed to existing curriculum demands ('pre-defined learning' as described by Salomon, 2000) rather than used as a tool to change the way teachers teach and children learn ('re-defined learning' as described by Kommers, 2003). The Interview Questions in data set 4 sought to explore this notion, however the Focus Areas being expressed in language not universally understood made it problematic eg. compare the teacher interview comment "...creativity and innovation depended on the Apps..."¹⁴ with the blog post¹⁵...

"...while they (*iPads*) are excellent for reading and engaging children with puzzles and games, our focus...will be using the *iPad* as a creative device. I want to see if we can record music for our class videos, use them to write scripts and create Powerpoints. We have a class TV station and we want to use them in production..."

to discern a certain lack of shared understanding between pilot participants of what *creativity* and *innovation* are in relation to supported learning with technologies.

Contributing to this problem may have been the fundamental design of the pilot (two *iPads* on loan for a limited period) and naming the study as a 'pilot'. This may have encouraged certain understandings and behaviours in participants that were not helpful to the pre-defined and redefined notions of learning. Having two *iPads* in a classroom of thirty or more students may have further fetishized the *iPad* as a desirable object (Farahmandpur, 2004) for its own sake rather than as a tool for learning.

"...We initially believed the level of engagement was due to the fact that the children were using something different – the *iPads* were a novelty..." (Blog post, Primary School J, week 4 of pilot).

"...We have had to create rosters to allow all 100 Stage 3 students time to use it (the *iPad*) in either Maths, English or Integrated studies. In these lessons we have observed the extensive opportunities the *iPads* have given to the students to allow them to explore different ways to express their learning. Students have been quite eager to ensure they have had their share of use with the *iPad*, with many choosing to use it when given free reward time in class..." (Blog post, Primary School G, week 8 of pilot).

"...At first the children (and the teachers) were enthusiastically looking at the games that could be downloaded to support learning. While all the games that the children have been using are really fun and reinforce skills taught in Mathematics, the difficulty has been sharing the *iPads* amongst four classes. It seemed that instead of supporting the learning while it was actually happening in the classroom, the students were looking on the *iPads* as a tool for playing games or as an incentive to finish class work and move onto the *iPads*..." (Blog post, Primary school I, week 3 of pilot).

¹³ "...that the observed particle is altered by the very act of observation..." (Heisenberg in Crotty, 1998, p. 29)

¹⁴ From Table 7 – data set 4 interviews with primary teachers.

¹⁵ From data set 5 – Primary school O, week 3 of pilot.

Also, the word ‘pilot’ may have encouraged short-term thinking about learning uses supported by the *iPad* rather than longer-term sustained thinking about re-defining the learning that becomes possible as a result of the technology being available.

Methodological issues notwithstanding, the pilot was structured to shed light upon specific focus areas and the pre-pilot workshop encouraged participants to:

- develop technology-enriched learning environments
- promote, support and model creative and innovative thinking
- personalize student learning.

Each of the Focus Areas is discussed below in relation to these.

4.2 FA1 – Learning Settings (Data sets 1, 2, 4 and 5)

The term *learning settings* (in this pilot) refers to the use of the *iPad* wherever learning happens in relation to the structured process of instruction. The selection of the learning setting and/or the tools should match the learning demands of the task that has been set (Figure 7). The selection might be made by the teacher or the student, depending on the purpose of the task and the point of need.

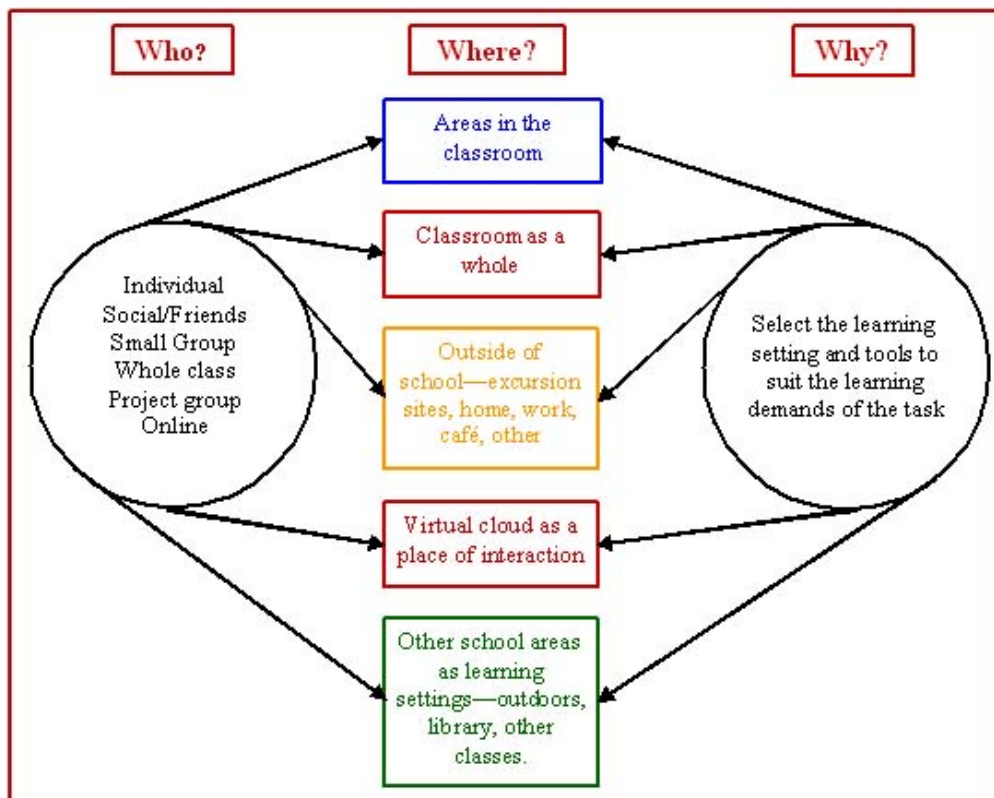


Figure 7: The demands of the learning task will dictate the selection of learning setting and the most appropriate tool.

The pilot found that the *iPad* supported learning in a variety of settings due to its portability and fit-for-task suitability. While the nature of the pilot made the selection of the *iPad* for learning a ‘given’, over time it was increasingly selectively used for the tasks which best suited its use rather than used simply because it was available in the pilot.

Activity early in the pilot showed a tendency for exploring the use of the *iPad* for learning while teachers and students worked out what it was best used for and in what settings.

“...the Stage 3 children have been enjoying learning through exploration and discovery with the *iPad*'s...in Maths lessons, the students take turns completing mental for 10 minutes...”
(Blog post, Primary school G, week 2 of pilot)

“The (year 7 Music) students really, really enjoyed using the *iPad*. They found that it was really easy to use and that it was a very attractive and aesthetic looking computer – the *iPad* was light and easy to carry around. They thought that it had excellent sound...” (Transcript of video blog post, Secondary school M, week 8 of pilot)

As the pilot progressed, more focused use started to occur.

“...Children work independently with the *iPads*. They “figure it out” as they go along with very little teacher intervention needed. A number of the applications we are using are multi-levelled and free! ...the children are successfully choosing an appropriate level to work at and are self-monitoring...” (Blog post, Primary school J, week 4 of pilot)

The *iPad* was used in individual and collaborative settings and in shared reading activities as well as cloud computing¹⁶...

In Design and Technology Year 7 students have used the *iPad* (mainly the *iFile* App) to actively investigate and create their own Digital Media. Students have used the voice recording function of the *iFile* App to record each other singing their favourite songs. Their saved sound files were then able to be downloaded via a specific IP address to be used with their video editing work. This ease of wireless file exchange assists the teacher in providing instructions, examples and work to multiple recipients at the same time...” (Blog post, Secondary school F, week 4 of pilot).

Taking the *iPad* to outside-of-school settings for learning would depend on available wireless connectivity – these *iPads* had wireless-for-free at school but had no 3G connectivity. Many venues where students might frequent – cafes, fast-food venues – have free wireless access.

4.3 FA2 – Learning Affordances (Data sets 1-5)

The term *learning affordances* (in this pilot) refers to the features of the *iPad* that indicate and support possibilities for its use by various users in various contexts. The *iPad* offered many features of use – especially the touchscreen and the swipe for page turning – that were intuitive rather than requiring tuition.

The pilot found that the design features of the *iPad* afforded learners quick access to the Apps they required for particular learning tasks. This ease of use appealed to a wide variety of users due to features which cater for different learning styles – visual (vibrantly coloured pictures, signs and symbols), tactile (using their hands and fingers to manipulate the object) and auditory (music, speech, read aloud).

Selected extracts from the blog (data source 5) illustrate these points.

Catering for learning styles:

“...The great thing about the I-pad is that it is there to support the many different ways students learn. If you are more of a visual learner, you could look at a video to understand, or if you are the person that learns better with audio, you could listen to some clips on the I-pad that relates to what you are currently learning. The I-pad is not limited to certain literacies, which is a good thing when you want different ways to learn.” (Blog post, Secondary school F, teacher comment, week 6 of pilot)

“...With the availability of the *iPads* we have been able to ensure ...(the children)...are maintaining an interest in learning regardless of the their preferred learning style. As a result, the learning becomes more personalised and meaningful...” (Blog post, Primary school K, week 6 of pilot).

The design features of the *iPad* (see also Interview Question 1 in Table 7):

“One of the biggest assets is that the kids engage with it so easily. Also the advantages are that it is portable, light and colourful. For those lower ability classes – it’s absolutely instant; you can flick from one thing to the other... potential to hold so much and the applications there and with more to come out means that it’s a tool that we’ll be definitely be using. They are fabulous, lighter and portable than a laptop...” (Blog post, Secondary school C, end of pilot)

¹⁶ Cloud computing involves the saving of user-created content to networked places other than a local device such that it can be selectively shared with others and accessed from anywhere at any time. It can also be user interaction with applications that are not run locally but over the network or web.

“The children found the iPads very easy to navigate as it is quite visual. Those that have difficulties with reading were able to find the App they wanted to use by clicking on the corresponding App's picture. Children learn by experiencing, and even those with no knowledge of how an iPod or iPad works were able to use them independently very quickly...” (Blog post, Primary school G, week 9 of pilot)

“Using the I-pad may sound complicated, but once held, is easy to get the hang of. The knowledge needed for using an I-pad is basically the knowledge to know how to operate simple technology devices. There is no actual skill required, except learning how to browse on the I-pad and find what you are looking for, which is quite easy to learn...” (Student blog post, Secondary school F, week 8 of pilot)

Multimedia capabilities:

“With the iPads the students can log in to our class blog and post new entries over our wireless network. They also use it for media and music classes. We have an ensemble and record what they perform with a multi-track recording App...other applications students use include *Scramble* to improve word skills, an interactive *Alice in Wonderland* picture-book and a maths training App *Mathletics*. They also use *ProPrompter* to play television scripts from which they can read, similar to a teleprompter. There is a possibility tablet computers could become a standard education tool in future. I believe there is room for all forms of media. There are some things the iPad can't do; for example, the students need laptops for video editing. We use the Mac and PC in conjunction with the iPad.” (Local newspaper article about the pilot, Primary School O, Year 4 teacher comment).

4.4 FA3 – Student Engagement (Data sets 1, 2, 4 and 5)

The term *student engagement* (in this pilot) refers to the capability of the iPad to support students to be actively involved in their learning, persist at an activity despite difficulties and to be excited about achievement in learning tasks.

The pilot found that the iPad was generally an engaging learning object depending on the choice of Apps. Both productivity and curriculum Apps (Appendix 2 has the full list of Apps and reviews) were appealing to users at some level, however it was the game Apps that clearly demonstrated the defining aspects of an ‘engaged’ learner.

The most popular game Apps such as *Puppet Pals*, *Story Builder*, *Math Magic*, *Kids Math*, *ABC Animals*, *I am Funk/Jazz*, *Glee*, *Toy Story*, *How to Train Your Dragon*, had common features which made them appealing to the user, gave on-going support and feedback and celebrated with them in some way at the end of the interaction.

For example, *Math Magic* (used in 4 Primary schools) prompted teachers to comment:

“Great way to learn Maths for children, colourful pictures accompany the problem and children click to choose the answer. Displays mathematical problems based on various operations. Player needs to answer questions in order to proceed through levels. The player can choose the operation to play and difficulty level. Activities based on addition, subtraction, multiplication and division. It can time you, check your answers and pick sums at random to keep the students on task...” (Teachers’ comments, Appendix 2)

← Appealing to the student

← Persist despite difficulties

← On-going support and feedback

One of the most popular Apps was *Puppet Pals* (used in 7 primary schools), which is not quite a game App and not quite a productivity App but more a content-creation App for sharing with others.

“Great tool for play-building and narrative writing. Work with a partner to make up a show after planning, writing and choosing characters and backdrops...create your own unique shows with animation and audio in real time. Simply pick out your actors and backdrops, drag them on to the stage, and tap record your movements and audio...record yourself talking as you move many different characters around in a puppet show...fun to share your story and create with

← Appealing to the student

← On-going support and feedback

← Celebrate achievements

friends...encourages interaction and cooperation...used in Menu-Board as a writing activity, literacy groups and for reward time..." (Teachers' comments, Appendix 2)

One secondary teacher found that boys (particularly reluctant readers) were engaged by various Apps:

"... have found my Year 9 Students who really struggle with English, get excited about Scrabble and even boys who really are difficult to engage in anything were having alternate turns in doing Scrabble against the computer. It helps with their spelling and it was fascinating that an old fashioned thing such as *Scrabble*...but those kids are rediscovering this through this format. To be perfectly honest if I had a twenty-minute period of a lesson and everyone was engaged on the iPads on *Scrabble*, academically I would think it was fantastic. This is because of the words the computer comes up with are words the kids haven't come up with, so this has lots of application and is very exciting..." (Blog post, Secondary School C, week 10 of pilot).

← Appealing to the student

← Appealing to the teacher

← On-going support and feedback

Post pilot interview question 3 (Table 7) supported these comments:

"Children were engaged through the use – especially boys"...

"Creativity and innovation depended on the Apps in use – several of the Apps allowed for differentiated use so that children could work at their own ability level (especially kept slower readers interested)"..."Gaming levels in many Apps were excellent for competition and motivation" (Post-pilot teacher interview comments).

'Engagement' is a complex psychological construct that is beyond the means of this pilot to properly comment upon except in simple, observable behaviours which might indicate 'engagement'. The blog post comments, the App reviews and the post-pilot interviews show that Apps on the iPad have the potential for engaging learners as part of a properly constructed learning sequence eg.

"...Games were chosen for children's interests and for their relation to class activities" (from Table 7).

4.5 FA4 – Students with Learning Difficulties (Data sets 1, 2, 4 and 5)

The term *students with learning difficulties* (in this pilot) refers to the capability of the iPad to support students who demonstrate syllabus outcomes at a level below their expected stage of learning for their chronological age "...because of the ways in which they learn or the rates at which they learn." (DET, 2007). Table 3 shows that, across years 2-10, four primary schools and one secondary school used the iPads to support the learning of children with learning difficulties (including children with English as a Second Language – an inclusion defined by the schools).

The pilot found that the learning affordances of the iPad and the range of Apps available allow learners of all levels to use it especially for reinforcement and rote learning of basic concepts. Specifically from Table 3, the iPad was used (at times "...extensively...") for revising and reinforcing:

- spelling, word understanding, sight words, phonics and reading (primary school English)
- mathematical concepts including number operations (primary school Mathematics)
- literacy basics and PDF textbooks (secondary school English).

Primary school J used the *Puppet Pals* and *Toy Story* Apps "...to develop oral language skills..." with their English-as-a-second-language (ESL) students. The teacher of this class said in their post-pilot presentation:

"...the interactive read-along of *Toy Story*. Children can listen, change voices or look at the pictures, play games, colour pictures, listen to songs and read along as the text is highlighted throughout the story and this was used in Literacy Groups and as a Talking & Listening¹⁷ activity and that App in particular engaged some of the boys who were very reluctant to read but enjoyed choosing that as an activity..." (Primary School J, post-pilot workshop presentation).

¹⁷ A reference to the New South Wales K-6 English syllabus.

Primary school A also used the *iPad* with their ESL students for development, revision and communication of ideas:

“...The *iPad* has been great for our English as a second language learners who find the work in Year 6 challenging. We have used *Balloon Pop* challenge to revise odd and even numbers, multiplication and division. They have also revised times tables through various apps. In the last week, *Story Builder* has been good for those who struggle with communicating their ideas. They record their story of the picture and listen to themselves afterwards.” (Blog post, Primary school A, week 4 of pilot).

Many participants, from both primary and secondary schools, identified the use of American accented voices present in most Apps as an issue with long-term use of the *iPad* for oral language development, especially in relation to pronunciation.

The secondary school was pleased with the usability of the *iPad* for literacy basics with their year 9 students:

“...What fun Year 9 had reading the Marvel Comics, www.marvel.com, on their *iPads*. Little did they realise that their English Teacher was actually teaching them about backgrounds and foregrounding, frames, and salient images. This vocabulary of visual language could be so easily integrated with the *iPads* that it made the lesson come alive... (Blog post, Secondary school C, week 7 of pilot).

The pilot found the *iPad* to be a successful support to the learning of students with learning difficulties though it would be enhanced with the availability of locally produced Apps.

4.6 FA5 – Educational Value of Apps (Data sets 2, 3, 4 and 5)

The term *educational value of Apps* (in this pilot) refers to the capability of Apps to support, reinforce or redefine the outcomes of the learning activity with which the children are engaged. Table 4 shows that participants tested a total of 202 Apps across English, Mathematics, Integrated Studies and Creative Arts for their support for learning.

The pilot found that some Apps were better than others at supporting learning and that 53% of all *iPad* use promoted ISTE.Nets Student Standards 3 and 4 (Table 6) ie. “Research and Information Fluency” (SS3) and “Critical Thinking, Problem Solving, and Decision Making” (SS4). The *iPad* was also used twice as often for Research (SS3) or Critical Thinking (SS4) than it was for Creativity (SS1).

These findings from Table 6 and Figure 2 seemed to depend on the:

- choice of Apps made available to students
- quality of Apps available for teachers to select for student learning
- time available to research and select appropriate Apps to support syllabus outcome achievement
- nature of the learning activities which can be enhanced with *iPad* use
- cost/benefit of App for learning.

These dependencies are mediated somewhat in this pilot by the teachers’ beliefs that using technologies makes a positive difference to student learning (100% in Figure 5) and that their own skill levels in the use of technology for learning “Closely Match” student learning demands (65% in Figure 4). Greater than 70% of the pilot teachers are also confident in using their learning about technologies to enhance and improve student learning experiences (Figure 6).

This was a self-professed highly motivated cohort with which to explore the educational value of Apps as shown below:

“...(we) selected Apps for use in literacy groups and also for how they related to relevant syllabus outcomes” (Post-pilot interview from Table 7).

“...A great app we have discovered is the book of *Hairy Maclary*. The children have looked at the repetitive language and patterns throughout the story. The children can listen to the story, read alone or record their own readings. Illustrations can be kept as originals or wiped and coloured in by the reader. This is quite an expensive app compared to some, but definitely worth the money...” (Blog post, Primary School K, Kindergarten teacher comment, week 10 of pilot).

"The stories are different because if you don't know a word they can read it to you!" (Year 4 girl)

“...the iPad has been successfully used to support the integrated learning of students and staff...students within a number of KLAs have used the iPad to assist them during classroom activities eg. some students have used the *Chalkboard* app during their math classes to expand on the mathematical formulas provided by their teacher. The students were then able to share their working out and final answer with their work buddies...” (Blog post, Secondary school F, week 4 of pilot).

The most commonly identified advantages of the use of Apps for learning were:

- Reinforcement and deeper exploration/application of learned concepts in novel situations
 - This was evident in the number of schools which used Apps to support deeper or “re-defined learning” eg. the Apps *Puppet Pals* and *Story Builder* allowed young writers to take their learnings about story-writing and develop them into a narrative which is not possible without the technology (Judson, 2006).
 - “...Great tool for play-building and narrative writing...work with a partner to make up a show after planning, writing and choosing characters and backdrops...encourages interaction and cooperation...” (Appendix 2, teacher comment about *Puppet Pals*).
- Practice learning by rote
 - eg. sight words to increase vocabulary in Apps such as *Word Search*, *Dictionary*, *K-3 Sight Words*, *Word Web* and others (Appendix 2).
- Learning was individualized with feedback built-in to most Apps
 - eg. quizzes and games in mathematics allowed for differentiation amongst learners in Apps such as *Math Magic*, *Let's Do Maths*, *Times Tables*, *Kids Math* and others (Appendix 2).
 - “...Great way to learn Maths for children – colourful pictures accompany the problem and children click to choose the answer. Displays mathematical problems based on various operations. Player needs to answer questions in order to proceed through levels. The player can choose the operation to play and difficulty level. Activities based on addition, subtraction, multiplication and division. It can time you, check your answers and pick sums at random to keep the students on task...” (Appendix 2, teacher comment about *Math Magic*).
- Easily learnt and navigated
 - eg. Integrated Studies used Apps for many different sources of information (atlases, recipes, fact sites, bible, astronomy tables) for personal study and research where the user had to find out for themselves how to use the App and navigate to appropriate sources such as *Google Earth*, *Trip View*, *BigOven Lite*, *Star Walk*, *Amazing Facts*, *Catholic Bible*, and others (Appendix 2).
 - “...This app was used by our Food Technology teachers when they were planning for their practical cooking lessons...great reference, simple recipes and always available...used it several times in Discovery Time where children were researching on their own...” (Appendix 2, teacher comment on *BigOven Lite*).

The most commonly identified disadvantages of the use of Apps for learning were:

- “...We love the fact that they are so quick to connect and the battery life is so long. Looking forward to using them as an *eReader* and podcast creator. Disappointing that *iBooks* only has older out of copyright books to download, as we would have liked to have a library of Young Adult titles to purchase...” (Blog post, Secondary school C, week 4 of pilot).
- A lack of local content or style or phonics
 - eg. *K-3 Sight Words* App was used by 2 schools for increasing the vocabulary of P-3 learners but the audio was accented and robotic and the font used was not the Foundation script used in NSW schools (Appendix 2 and Table 7)
- Many Apps were not suitable for Stage 3 learners in particular – they were either too simplistic or too complicated.

4.7 FA6 – Technical or Administrative Issues (Data sets 1, 2, 4 and 5)

The term *technical or administrative issues* (in this pilot) refers to the survey items shown in Figure 3. These are:

1. Navigation of menus
2. Connectivity
3. Sync'ing the iPads

4. Time taken to manage
5. Lack of ability to multitask
6. Distraction to self and others.

The pilot found that while items 5 and 6 were identified pre-pilot as the main administrative issues, post-pilot results showed that items 2, 3 and 4 were in reality the major problems. Items 3 and 4 are closely related and it seems that using the *iPad* as a ‘wePad’ (*many-to-one* setup and use – see below) contributed to the difficulties experienced in these two items.

The pilot provided two *iPads* to each school for use in classrooms as a shared mobile device. However, by virtue of its name and the technical strictures imposed by *Apple* on the use of *iTunes* and Apps, the *iPad* is branded, marketed and designed as a single user device. This conflict of purpose presented some administrative challenges in schools. Three models of *iPad* setup for classroom use are explored below.

The first model is what might be called a *one-to-one* setup ie. using the *iPad* as an “i”Pad with one *iTunes* account to one *iPad* and used where all users have personal access to their own device eg. students bring their own *iPad* to class and use their own *iTunes* account. Some features of this model are:

- A single user of an *iPad* will have an *iTunes* account (email address and password required) and use the *iTunes* software to ‘purchase’¹⁸ and download Apps to the *iPad*. Apps can also be purchased and downloaded through the *App Store*¹⁹ using the same account details.
- Because the Apps may come from different sources (*iTunes* or *App Store*), the *iPad* must be sync’ed with the *iTunes* account so that there is an authoritative backup and record of all Apps authorised (ie. licensed) for that *iPad*.
- This type of setup is typical of someone who buys the *iPad* for personal use and sets it up to not only access Apps, but also to use the considerable number of productivity functions of the *iPad* including email, calendaring, browser bookmarking, note-taking, *Evernote* groupwork, camera, voice-recording, diary, music player and storage. These contain personal and private information and would not be shared with others, as the device is generally not lent to anyone else.

Some management considerations of the *one-to-one* model might be:

- There would be a need to advertise Apps necessary for classes in advance for students to download prior to class.
- All account management is the responsibility of the student which may be problematic for younger users
- This may be outweighed by its flexibility as a learning support tool for all year levels. As teachers commented (Table 7) about learning in a *one-to-one* setting:
 - “...with each child having an *iPad*, this would challenge teachers to cater for a different way of learning...”
 - “...schoolbag size would be smaller as they would not need to carry so many textbooks...”
 - “...provide access to experiences not available elsewhere...”
 - “...Instant differentiation and reinforcement...”
- There is scope here for the replacement of heavy textbooks with *iPad* Apps which could be specified on ‘book’ lists at the start of the year for students to purchase in the same way as textbooks in the past.

The second model is what might be called a *one-to-many* setup ie. one *iTunes* account to many *iPads* eg. a teacher sets up a group of up to five *iPads* with the same content for classroom use. Some features of this model are:

- Through a single *iTunes* account, downloaded Apps may be sync’ed with up to five *iPads*
- This is a quick way to ensure the same content is available for learning across all *iPads*.

Some management considerations of the *one-to-many* model might be:

- The end-user license agreement of any App is for a single user only. Sync’ing to five *iPads* for classroom use may be a breach of the licensing terms and conditions whether or not the *iPads* are personally owned or not.

¹⁸ *iTunes* requires the ‘purchasing’ of all Apps whether they are free or not ie. the user must log into their *iTunes* account with a password to authorize the download. The account owner will be sent a Tax Invoice via email, showing the purchase amount – even if the amount is AUD\$0.00.

¹⁹ The *App Store* is an *Apple*-owned online store.

- *Apple* is working on a volume licensing agreement for Apps but this is (currently) only for the United States.
- Until volume user licensing is available in Australia, this model (while technically possible) may infringe current End User Licensing Arrangements. This only became clear toward the end of the pilot.
- The purchase of App software however, is very cheap by comparison with the cost of computer software. This makes it cheaper to setup *iPads* than computers for classroom use depending on the software required.

One school experienced difficulties with this model early in the pilot:

“...we need some tips for syncing our 3 *iPads* (2 from the pilot and 1 of our own) to our school *iTunes* account on the one computer. It is probably something very simple but the computer seems not to be reading/registering the *iPads* when they are plugged in the way it does with our school *iPod*. We want to transfer the Apps we have purchased on one *iPad* to the other two???” (Blog post, Primary school N, week 2 of pilot)

The third model is what might be called a *many-to-one* setup ie. many *iTunes* accounts to one *iPad* eg. different class teachers use the same *iPads* for different classes. Some features of this model are:

- A single *iPad* can have many users who have their own *iTunes* accounts.
- Different users will logout of their account prior to passing the device off to other users to ensure that their account is not used by others to make purchases.

Some management considerations of the *many-to-one* model might be:

- All Apps downloaded to a shared *iPad* will appear on the menu screens for all users to access no matter who is logged in, nor who downloaded the App.
- Only the account holder who downloads an App is able to update or sync it to their *iTunes* account.
- Users will need training to login and logout of their *iTunes* account using the *iPad* ‘Settings’ menu.
- It takes time for individual users to manage the required setup of the *iPad* for their classes. If a Teacher Aide is performing the setup then they will need password access to the teachers’ *iTunes* account.
- A classroom activity would normally require more than one *iPad* and the management time would consequently increase in this model.

The pilot found that the most successful model used by teachers was a variation on the *one-to-one* model. The teacher created a separate *iTunes* account for each of the two *iPads* using a web-based email account from *Gmail*²⁰ or similar. This required individual setups for the *iPads* (which is possible with only two *iPads*), but would be problematic with respect to time with higher numbers of *iPads*.

In terms of connectivity as a technical issue, several schools had some problems achieving satisfactory wireless connections with the *iPad*, but without further information it was not possible to determine whether this was an *iPad* issue or a school wireless infrastructure issue. However, one school observed that...

“...one of our two *iPads* has had great difficulty accessing wireless for internet connection. We will monitor this closely- but it does intermittently drop out from the network...another potential problem is that the *iPad* needs to be used at school if they do not have wireless internet at home...(and without 3G connectivity)...this restricts teachers from home preparation ... (and so)...our knowledge of Apps is limited and therefore not realising its full potential...” (Blog post, Primary school D, week 4 of pilot).

5.0 Conclusion

Despite some methodological caveats, the pilot found that the *iPad* is a significant tool to support and enhance student learning. The *iPad* showed extensive affordances as a learning tool (due in part to its portability and fit-for-task suitability) especially in relation to the development of Critical Thinking, Problem Solving, Decision-Making, Research and Information Fluency.

²⁰ *Gmail* is a free email account service offered by Google. See <http://mail.google.com/mail/>

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Appendix 1

ISTE.Nets Student Standards²¹

SS1. Creativity and Innovation

Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology. Students:

1. apply existing knowledge to generate new ideas, products, or processes
2. create original works as a means of personal or group expression
3. use models and simulations to explore complex systems and issues
4. identify trends and forecast possibilities.

SS2. Communication and Collaboration

Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others. Students:

1. interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media
2. communicate information and ideas effectively to multiple audiences using a variety of media and formats
3. develop cultural understanding and global awareness by engaging with learners of other cultures
4. contribute to project teams to produce original works or solve problems.

SS3. Research and Information Fluency

Students apply digital tools to gather, evaluate, and use information. Students:

1. plan strategies to guide inquiry
2. locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media
3. evaluate and select information sources and digital tools based on the appropriateness to specific tasks
4. process data and report results.

SS4. Critical Thinking, Problem Solving, and Decision Making

Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. Students:

1. identify and define authentic problems and significant questions for investigation
2. plan and manage activities to develop a solution or complete a project
3. collect and analyze data to identify solutions and/or make informed decisions
4. use multiple processes and diverse perspectives to explore alternative solutions.

SS5. Digital Citizenship

Students understand human, cultural, and societal issues related to technology and practice legal and ethical behaviour. Students:

1. advocate and practice safe, legal, and responsible use of information and technology
2. exhibit a positive attitude toward using technology that supports collaboration, learning, and productivity
3. demonstrate personal responsibility for lifelong learning
4. exhibit leadership for digital citizenship.

SS6. Technology Operations and Concepts

Students demonstrate a sound understanding of technology concepts, systems, and operations. Students:

1. understand and use technology systems
2. select and use applications effectively and productively
3. troubleshoot systems and applications
4. transfer current knowledge to learning of new technologies.

²¹ See <http://www.iste.org/standards.aspx>

Appendix 2

All Apps – listed and reviewed

APPS used by schools in the iPad pilot (ranked by Subject, popularity of use and then alphabetically)

App Title	Description	Use in Learning	Tag	²² P# / S#
ENGLISH				
Puppet Pals	Record yourself talking as you move many different characters around in a puppet show. Fun to share your story and create with friends. Record movements and audio Create your own unique shows with animation and audio in real time. Simply pick out your actors and backdrops, drag them on to the stage, and tap record your movements and audio.	<ul style="list-style-type: none"> Used in Menu-Board as a writing activity, literacy groups and for reward time. Great tool for play-building and narrative writing. Work with a partner to make up a show after planning, writing and choosing characters and backdrops. Retelling stories Rehearsal, and reflection of drama presentation Encourages interaction and cooperation 	Writing Language	P 7 / S1
Word Search	A find-a-word game - touch to highlight words in the maze. Uses predefined topics only. Simple tracing function that is good for direction but can be confusing as it is not Foundation print.	<ul style="list-style-type: none"> Spelling activity in Menu Board Silent reading program (S) 	Spelling Writing Reading	P4 / S1
Dictionary	Type words to retrieve meanings. Includes a Thesaurus. Online dictionary pronounces the word, puts it in a sentence and gives synonyms.	<ul style="list-style-type: none"> Menu Board and spelling activities Literacy groups with a small group activity Used independently to help with their writing Used by more capable readers working on comprehension skills 	Spelling Writing Comprehension	P3 / S1
Story Builder	Narrating and recording elements of a story by looking at a picture. Use the story starters to build a story or start from scratch. Develops paragraph formation and integration of ideas.	<ul style="list-style-type: none"> Constructing meaning from text, finding information identifying information, sequencing, concluding, summary and inference, identifying cause and effect, identifying fact and opinion, identifying point of view and purpose, finding similarities and differences 	Reading Comprehension	P2 / S1
K-3 Sight words	P-3 sight words	<ul style="list-style-type: none"> Read the list and use the audio to check words. Quite robotic Not in Foundation print Not great for beginning readers. 	Reading	P2 / S0
Hangman	Traditional game of 'Hangman' where you guess words. Play by yourself or with a partner.	<ul style="list-style-type: none"> Used as a menu board spelling activity. 	Spelling Reading	P1 / S1
WordWeb	A dictionary and thesaurus	<ul style="list-style-type: none"> Used by our students during classes to investigate the meaning of key vocabulary words for their subject. 	Spelling	P1 / S1

²² P# / S# refers to the number of Primary and/or Secondary schools which used the App.

ABC Blocks on the farm	Suitable for infants and lower primary. Spell words by placing blocks one on top of the other.	<ul style="list-style-type: none"> Activity groups 	Spelling	P1 / S0
ABC Writing	Uses words from the 73 word families. Features include, spelling of each word, letter sounds, pronunciations, and letter formations.	<ul style="list-style-type: none"> Special needs 	Spelling	P1 / S0
Alphabet Tracing	Fun animations show you the proper way to write alphabet letters and numbers. Trace letters, use colours and draw.	<ul style="list-style-type: none"> Excellent for practicing phonics and handwriting in K-1. 	Spelling Writing	P1 / S0
Boggle	An interactive version of the original board game.	<ul style="list-style-type: none"> Enhances spelling skills and vocabulary. 	Spelling	P1 / S0
Chicktionary	Use the letters to spell as many words as possible in a given time. Provides hints and various methods of how to play.	<ul style="list-style-type: none"> Menu Board 	Spelling	P1 / S0
Learning Pad	Simple letter, colour and sound activities	<ul style="list-style-type: none"> K-1 used this to practice and explore sounds, letters and colours. 	Letters Colours	P1 / S0
Look and Spell	Shows pictures and the user must spell the words. Only 3 letter words.	<ul style="list-style-type: none"> Used as a spelling activity for children who are below a stage one level 	Spelling	P1 / S0
Pocket Phonics	Helps children understand the sounds that letters make. Can trace and click on pictures to match sounds.	<ul style="list-style-type: none"> Excellent for practicing phonics and handwriting in K-1. 	Reading Writing	P1 / S0
RIBC Key signs AUSLAN	Shows you how to use sign language for the alphabet and words. Created by the Royal Institute for Deaf and Blind children.	<ul style="list-style-type: none"> Special needs 	Speaking Listening	P1 / S0
Spelling bee		<ul style="list-style-type: none"> Targeted groups 	Spelling	P1 / S0
Story Buddy	Write a script for a story and then publish it. Suited to infants but can be used across all grades.	<ul style="list-style-type: none"> Activity groups 	Writing	P1 / S0
Story Kit	A variety of stories which the children can read. Teacher can edit text.	<ul style="list-style-type: none"> Children used stories for reading and sharing. Teachers made changes to pages to suit the needs of their Literacy groups, eg editing tasks, blank pages. 	Reading	P1 / S0
Tap to talk	Simple words are put into sentences at the touch of the user.	<ul style="list-style-type: none"> The challenge is to create a more interesting sentence than the <i>iPad</i> gave Voice very robotic Sentences are not very challenging 	Writing	P1 / S0
Typing Trainer	Type any text or preinstalled exercises. Test typing for speed and accuracy.	<ul style="list-style-type: none"> Good for students with high computer usage or with writing difficulties. Special needs. 	Writing	P1 / S0
Word Dropping	Spell a word as letters drop.	<ul style="list-style-type: none"> Can be difficult as the letters fall quickly 	Spelling	P1 / S0

Words	Uses word families to teach reading. It includes, word flashcards, spelling words, unscramble words and a prize section.	<ul style="list-style-type: none"> Special needs 	Reading Spelling	P1 / S0
Pages	Touch-based word processor	<ul style="list-style-type: none"> Productivity at all levels 	Writing	P0 / S2
Befuddled HD	Creating words from letter puzzles	<ul style="list-style-type: none"> Phonetic awareness, phonics, vocabulary, comprehension 	Reading	P0 / S1
DC comics	Download and view various comic styles and genres.	<ul style="list-style-type: none"> Used during our silent reading program as another reading source. 	Reading	P0 / S1
iAnnotate PDF	Editing PDF's - highlight, comment, colour-code label, etc.	<ul style="list-style-type: none"> Productivity at all levels 	Reading Comprehension	P0 / S1
iTalk Business Lite	Puzzle-based games to improve the use of business English	<ul style="list-style-type: none"> Special needs 	Reading Comprehension	P0 / S1
Mobile RSS	Access and manage RSS subscriptions via a Google Reader account	<ul style="list-style-type: none"> Productivity at all levels 	Reading Comprehension	P0 / S1
Parts of Speech	Puzzle-based games for identifying the use of nouns, adjectives, adverbs.	<ul style="list-style-type: none"> Features of a written text, words, genre, grammar and punctuation 	Writing	P0 / S1
Story Cubes	Writing tool for reluctant writers	<ul style="list-style-type: none"> Special needs 	Writing	P0 / S1
Ult Alphabet	Select a letter and find the items in an image that start with that letter. Then enter the correct spelling to display a definition of the item.	<ul style="list-style-type: none"> Used during our silent reading program 	Reading, Spelling	P0 / S1
Vocabulator	Creating words from letter puzzles	<ul style="list-style-type: none"> Phonetic awareness, phonics, vocabulary, comprehension 	Reading	P0 / S1
Word Warp Xtreme	Dictionary-based word puzzles	<ul style="list-style-type: none"> Phonetic awareness, phonics, vocabulary, comprehension 	Reading	P0 / S1
MATHS				
Math Magic	Great way to learn Maths for children, colourful pictures accompany the problem and children click to choose the answer. Displays mathematical problems based on various operations. Player needs to answer questions in order to proceed through levels. The player can choose the operation to play and difficulty level. Activities based on addition, subtraction, multiplication and division. It can time you, check your answers and pick sums at random to keep the students on task.	<ul style="list-style-type: none"> Easy –better suited to Years 3&4 Used as a warm up activity. 	Numeracy	P4 / S0
Jumbo Calculator	Large, easy to use and see calculator.	<ul style="list-style-type: none"> Good use in Maths, easy to see as it's big. Big buttons simple to use Great for learning to use calculator good to use on interactive white board 	Calculators	P3 / S2

Let's Do Math!	A timed Maths quiz with a multiple choice algorithm. Mental activities to promote knowledge of number facts. Mental computation of mainly addition and subtraction.	<ul style="list-style-type: none"> For Stage 2 and lower Stage 3 Different levels allow for different abilities Used as a warm up activity. 	Addition Subtraction	P3 / S0
Times Tables	Displays times tables and allows the player to practice and consolidate their understanding of times tables with quizzes and time-pilots.	<ul style="list-style-type: none"> Review, write answers, listen to, and be timed Used a lot for counting by twos and fives Good, educational, bit easy - better suited for years 3 & 4 	Times tables	P3 / S0
Kids Math	Displays mathematical problems based on various operations. Player needs to answer questions in order to proceed through levels. The player can choose the operation to play and difficulty level. The problems are graphically and numerically represented.	<ul style="list-style-type: none"> Year 7 Design & Technology students investigated this app as a form of Digital Media to highlight the different display examples. English-as-a-Second Language students also used this app to practice their addition and subtraction skills. Used as a warm up activity. (P) 	General operations	P2 / S1
Pizza Math	Fractions game - click on picture to match the fraction. Choose the correct fraction to match the pizza.	<ul style="list-style-type: none"> Easy –better suited to Years 3&4 and used on the interactive whiteboard as a warm up activity to get students focused for the lesson and drawing the link between the written fractions and the picture. 	Fractions	P2 / S0
Times Tables	Activities to learn and practice multiplication facts. Focuses on learning the multiplication tables. It goes through each of the timetables and has timed quizzes and multiple difficulty levels.	<ul style="list-style-type: none"> Used as a competition or warm up activity with a child who could not grasp times tables and with good results. 	Multiplication	P2 / S0
MathBoard	Good but hard to understand at first. Helps user to work out problems by seeing the working out – just like a Maths teacher. Provides the user with problems to answer using various mathematical calculations. Can select answer from the provided options. Also provided is working out space to assist students with their thought process.	<ul style="list-style-type: none"> Used during Connected Learning (CL) group activities and math lessons when students participated in solving mathematical problems. Allowed students to work out and solve the provided problems at their own pace and share their problem solving methods with their groups. 	Problem solving	P1 / S1
123 Match	A matching game that will help the user learn what numbers from 1 to 100 look and sound like. Flip the tiles of the game over to reveal the numbers. Match any two, and that pair of number tiles remains revealed. The object of the game is to reveal all the number tiles on the board.	<ul style="list-style-type: none"> Some felt it was too hard to understand 	Numeracy	P1 / S0
Ace Multiply	Mental multiplication practice through a variety of games	<ul style="list-style-type: none"> Practicing quick recall of multiplication facts. Used as a competition or warm up activity. 	Multiplication	P1 / S0
Alien Equation	Multiplication and division with a puzzle in various sequences.	<ul style="list-style-type: none"> Good but hard. 	Multiplication Division	P1 / S0
Balloon Pop	Fun, interactive way to get students interested in Maths and revise times tables, factors and simple sums.		Multiplication Addition	P1 / S0
Balloon Puff	Very simple game of popping balloons for points	<ul style="list-style-type: none"> Great game for increasing concentration. Some children were able to use the calculators and compare their scores 	Concentration. Numeracy	P1 / S0

Calendar	Forms for day, week, month with the ability to include events at certain times.	<ul style="list-style-type: none"> Children made their own timetables for a variety of situations. Solved word problems for mathematics using the calendar. Planned make-believe days. 	Timetables Word problems	P1 / S0
Clockmaster	Matching analogue time to digital	<ul style="list-style-type: none"> Used to extend children who are working beyond Early Stage 1 time outcomes 	Time	P1 / S0
Edu-Dice	Dice and activities for counting, one to one correspondence and adding.	<ul style="list-style-type: none"> Appropriate for early infants. Simple games used to practice counting and adding. 	Numeracy	P1 / S0
Flash Card Set	Displays mathematical problems based on various operations. Player needs to answer questions in order to proceed through levels. The player can choose the operation to play and difficulty level.		Game	P1 / S0
iLive Math Oceans	Uses the background of the ocean and animals to make up Maths problems to solve.		General operations	P1 / S0
Kids Math Fun	Mental activities to promote knowledge of number facts. Mental computation of mainly addition and subtraction.	<ul style="list-style-type: none"> Children answer Maths number sentences. They are given answers to choose from. Different levels allow for different abilities. Used as a warm up activity. 	Mathematics	P1 / S0
Maps	Set of maps gives the ability to search for specific places and to give the directions to and from a designated location.	<ul style="list-style-type: none"> Children solved mathematics investigations where they had to give and follow directions, find the shortest routes and calculate a variety of distances. 	Navigation	P1 / S0
Math Bingo	Based on the traditional concept of bingo. The player selects the operation and skill level before playing a timed a game.		General operations	P1 / S0
Match up Maths	Allows you to match tiles with the same value to clear the board and score points. You can use fractions decimals, multiplication division addition and subtraction.	<ul style="list-style-type: none"> Suitable for upper Primary. Provides easy, medium and difficult levels. 	Numeracy	P1 / S0
Math City	Displays mathematical problems based on various operations. Player needs to answer questions in order to proceed through levels.		General operations	P1 / S0
Math Ninja	Use Maths skills to defend your tree-house against a hungry tomato and his robot army.	<ul style="list-style-type: none"> Great use in Maths and as a reward game. Good fun 	Numeracy	P1 / S0
Tangram	Provides templates where shapes need to be chosen to create the picture.	<ul style="list-style-type: none"> More challenging than the "Tangrams" app Good for improving spatial awareness 	Problem solving	P1 / S0
Tangrams	Creating simple pictures using tangrams	<ul style="list-style-type: none"> Used extensively by the children to create a variety of pictures using tangrams. Encouraged children to time themselves and create their own challenges 	Problem solving	P1 / S0

Tic Tac Maths	Fun interactive way to get students interested in Maths using noughts and crosses		Logic	P1 / S0
Times Tables Tiger	The Lite version used Times Tables 1-4. Provided flash cards and a quiz for students to learn their tables. Very colourful and interactive.		Multiplication	P1 / S0
Undersea Math	In this free app, add up the sums and move the answer tiles to cover the sum. The end outcome is you get to see the picture.		Addition	P1 / S0
Warp factor		<ul style="list-style-type: none"> Assists revision of multiples through a game using spaceships. 	Multiples	P1 / S0
What's the time?	Includes four activities, where you can win prizes for completing the levels.	<ul style="list-style-type: none"> Great way to learn how to tell time. Four levels of difficulty 	Measurement	P1 / S0
Math Ref Free	Reference guide for commonly used formulae. Primary number problems.	<ul style="list-style-type: none"> General Maths problem solving, fractions, puzzle-solving. 	Numeracy	P0 / S2
Numbers	Reasonably full-featured spreadsheet application for the iPad similar to "Numbers" on the Macintosh.	<ul style="list-style-type: none"> Manipulation of data, Use of formulae 	Spreadsheet	P0 / S2
Brain Gym	General puzzle-solving	<ul style="list-style-type: none"> General Maths problem solving, fractions, puzzle-solving. 	Problem solving	P0 / S1
Fraction Time		<ul style="list-style-type: none"> General Maths problem solving, fractions, puzzle-solving. 	Fractions	P0 / S1
Freddy Fraction	Fraction-based puzzle-solving games	<ul style="list-style-type: none"> General Maths problem solving, fractions, puzzle-solving. 	Fractions	P0 / S1
IQ Gym	Solve mathematical questions within a time-limit	<ul style="list-style-type: none"> General Maths problem solving, fractions, puzzle-solving. 	General quiz	P0 / S1
iSpreadsheet	This app allows students to complete mathematical calculations in the form of a spreadsheet. Students are able to enter spreadsheet formulas and add text formatting to their document.	<ul style="list-style-type: none"> This app was used during Information and Software Technology classes to demonstrate other spreadsheet software and to provide students with an alternative to Microsoft Excel. 	Spreadsheets	P0 / S1
Pocket CAS	Edit equations.		Algebra	P0 / S1
Quick Graph	Graphic Calculator		Graphing	P0 / S1
Spark Vue	Real-time measurement, data visualisation and analysis including an accelerometer to record and graph acceleration		Mathematics	P0 / S1
Tic Tac Frac	Tic-tac-toe game-based on fractions	<ul style="list-style-type: none"> General Maths problem solving, fractions, puzzle-solving. 	Fractions	P0 / S1
Wolfram	Computational knowledge engine with mathematical and scientific information		Algebra	P0 / S1

INTEGRATED STUDIES				
Google Earth	Great app for searching for landmarks. Satellite and aerial imagery of populated areas of the planet	<ul style="list-style-type: none"> The students enjoyed using this app in our integrated lessons on Antarctica and our school. Students used Google Earth during CL lessons to investigate various sites around the world. 	HSIE	P2 / S1
DigiMacq	Virtual tour through historic Parramatta, Multimedia adventure movie giving information about Governor Lachlan Macquarie in the Parramatta area.	<ul style="list-style-type: none"> Good for Year 3 and 4 Early Australia units. Used in Literacy groups, whole class teaching activities revolving around our early Australia unit. 	HSIE History	P 2 / S0
Trip view	Maps and timetables for Sydney buses, trains and ferries.	<ul style="list-style-type: none"> Great use for planning excursions and Maths Time activities using timetables 	HSIE Mathematics	P 2 / S0
BigOven Lite	This app provides 170,000 recipes and cooking ideas that are simple and easy to find.	<ul style="list-style-type: none"> This app was used by our Food Technology teachers when they were planning for their practical cooking lessons. Great reference, simple recipes and always available. Used it several times in discovery time where children were researching on their own. 	Cooking planning and Discovery Time	P1 / S1
History Maps	Many different links to historic world maps. High resolution historical maps of the world	<ul style="list-style-type: none"> Bit too complicated for Stage 3 but enjoyed looking at the maps in integrated lessons. 	History HSIE	P1 / S1
Star Walk	Look and learn about stars and planets. Tilt the iPad towards the sky to activate the Digital Compass to determine location and orientation. Personal planetarium including an internal accelerometer and compass to show names of constellations and planets	<ul style="list-style-type: none"> Really interesting and educational Good for a Year 4 unit on space. Learnt a lot about constellations. See Space in 1984! 	Science	P1 / S1
123 World Geography HD	Uses engaging artwork, sound effects, animation, live Google maps, and music from around the world. Includes voice-overs of numbers and letters spoken in multiple languages, making it a powerful tool for introducing children to other languages.	<ul style="list-style-type: none"> Easy to use and fun A great way to learn about world geography Great help in Integrated studies lessons. 	Geography	P1 / S0
3D Brain	Full analysis of the human brain	<ul style="list-style-type: none"> Used as a follow-up to a visit to the Life Education Centre. 	Science	P1 / S0
Amazing Facts	Multiple categories with facts written on pieces of paper the shape of a head		Research	P1 / S0
Animal eyes	Photos that focus on the eyes of different animals	<ul style="list-style-type: none"> Used with infants students in various units 	HSIE	P1 / S0
Antarctica	Online encyclopedia, pictures and internet links to Antarctica-related topics.	<ul style="list-style-type: none"> A fantastic tool for completing individual learning projects on Antarctica. 	HSIE	P1 / S0
Aussie Wildlife II	This app has information about 4 Australian wildlife animals. There are sounds, pictures and information.	<ul style="list-style-type: none"> Used for researching environments/animals for integrated unit. The writing was a little hard to read 	HSIE Animals	P1 / S0

Australian Facts	Displays a map of Australia and lists important information about each state and territory including history, transport, population, main cities, geography.		HSIE	P1 / S0
Catholic Bible	Enables you to find scripture readings quickly especially for students with learning difficulties who find a book bible difficult to use.		Religion	P1 / S0
Constitution of Australia	Contains a copy of the Australian Constitution.	<ul style="list-style-type: none"> Used for a unit on Australian Government 	Research HSIE	P1 / S0
Globe for iPad	Shows you a 3D globe which you can drag to find a country of your choice. When you click on the country it provides you with information about this country including flag, population, area, currency.		HSIE	P1 / S0
Google	This is the number one choice for searching on the internet.	<ul style="list-style-type: none"> This tool was used a great deal in integrated lessons and in Computer time during Menu Board activities. 	Research HSIE	P1 / S0
Horses	Series of quiz cards on horses	<ul style="list-style-type: none"> Children interested in learning more about horses 	HSIE	P1 / S0
I here ewe	Pictures of transport and animals and the sounds they make	<ul style="list-style-type: none"> Simple animal pictures but the transport pictures were of most interest 	HSIE	P1 / S0
iSpeak Italian	Allows you to learn a different language.	<ul style="list-style-type: none"> Write text in another language and have it translated and spoken in Italian. Recite the conversation or sentence. Other languages include French, German and Spanish. 	LOTE	P1 / S0
Life of St Vincent De Paul	Allowed students to research the life of St Vincent De Paul through his autobiography.		Religious Education	P1 / S0
Melbourne Museum Please Touch	Access various exhibitions.		HSIE Science Technology	P1 / S0
Penguins Free	Shake to see different pictures of penguins and their calls	<ul style="list-style-type: none"> Good for our integrated unit on Antarctica Not quite practical as a research tool. 	HSIE Animals	P1 / S0
Science Quiz	Multiple choice questions on science topics.		Science	P1 / S0
Sound Levels	Measures noise in decibels	<ul style="list-style-type: none"> Students demonstrated that the noise levels in the flexible learning spaces were heading towards critically loud on the scale. 	Research Science	P1 / S0
Thermometer	Advises temperature based on current information	<ul style="list-style-type: none"> Students measured the temp each morning 	Science	P1 / S0
YouTube	Access to a multitude of sources of videos.	<ul style="list-style-type: none"> Watched movies on topics being studied in class such as the life cycle of plants, dreamtime stories etc. Searched for, and used various songs. 	HSIE music	P1 / S0
SMH	Provides access to the <i>Sydney Morning Herald</i> newspaper - must be a registered user.	<ul style="list-style-type: none"> Downloaded the newspaper as research source across multiple subjects. 	World news Research	P0 / S3

ABC News	Gathers news, videos and audio from ABC		HSIE	P0 / S1
American ABC News	American ABC - a portal to the news program and other American related TV programs.	<ul style="list-style-type: none"> This app was used during class preparation time to assist in information gathering. 	Contemporary world news	P0 / S1
BrainPOP	Animations on science, health and technology and interactive quizzes		Research Science	P0 / S1
Duck Duck Go	Search Engine for fast facts		Research HSIE	P0 / S1
eClicker	Real time response to questions posed		Research HSIE	P0 / S1
Getty Images	24 million professional images		HSIE Research	P0 / S1
Molecules	3D renderings of molecules to manipulate		Science	P0 / S1
News Pro	Reuters top news stories		World News	P0 / S1
Planets	3D guide to the solar system		Science	P0 / S1
Sydney HD	Provides satellite photos of areas around Sydney and its landmarks	<ul style="list-style-type: none"> Used during CL classes to investigate the geographical location and features of Sydney. 	Geography	P0 / S1
Touch Physics	Collection of 49 hand-drawn levels of interactive physics-based games		Science	P0 / S1
Wikipanion	Clear, simple and searchable interface for Wikipedia entries		Research HSIE	P0 / S1
World Fact Book	Complete CIA World Fact book with information from 250 countries		Research HSIE	P0 / S1
CREATIVE ARTS/ DIGITAL MEDIA				
Mini-Piano	Mini piano that you can play 8 keys or have it play the keys for you.	<ul style="list-style-type: none"> Helped in music lessons Develop on your piano skills Has only 8 notes but is very clear Use with IWB to teach notes on keyboard 	Music	P2 / S0
Draw free	Drawing app to sketch, draw, doodle and draw on photographs. Blank canvas for writing, drawing and adding saved photos.	<ul style="list-style-type: none"> Very simple app but the children enjoyed adding text and speech bubbles to photos of themselves. 	Digital media Drawing Writing	P1 / S1
ABC Animals	Fantastic photos and print displaying a wide range wildlife A-Z	<ul style="list-style-type: none"> The children were really interested in this app and tried predicting what they would see and listing the creatures missing. Excellent pictures 	Concentration	P1 / S0
ABC for kids	Music featuring the Wiggles and Justin Clarke	<ul style="list-style-type: none"> The children had a great time singing along and watching clips from songs they know well. 	Music Language	P1 / S0
Build a brag book	Templates where stories can be created recorded and shared.	<ul style="list-style-type: none"> Children created their own stories to share with others. Photos and audio can be recorded. Books can be made for different occasions. 	Photos language	P1 / S0

Draw Free	Drawing tool. Children were able to upload photos or images from the web and then draw on top of them. They can also begin with a blank canvas and draw what they'd like.		Drawing	P1 / S0
Drawing Pad	Tool for drawing and colouring	<ul style="list-style-type: none"> Used for fun, extra time or as an art lesson. 	Drawing	P1 / S0
Glitter Draw	Write or drawing.		Drawing, Spelling, Writing	P1 / S0
Glow Draw	Allows children to use their fingers to write or draw. To clear the screen, shake the iPad. Children can choose the suitable level.	<ul style="list-style-type: none"> Used to write sight words and to help with letter formation. 	Drawing, Spelling, Writing	P1 / S0
I am Funk	Very simple app to create funk music in seconds.	<ul style="list-style-type: none"> An instant composition of funk music that can be changed in seconds. The children loved comparing compositions and creating their own dances 	Music	P1 / S0
I am Jazz	Very simple app to create jazz music in seconds.	<ul style="list-style-type: none"> An instant composition of jazz music that can be changed in seconds. The children loved comparing compositions and creating their own dances 	Music	P1 / S0
iTunes	Allows children to search for a variety of songs and applications for download and purchase.	<ul style="list-style-type: none"> Children searched for music and applications to download and purchase for the iPads, iPods and for use in their personal research projects. 	Music	P1 / S0
Pro-prompter	Allows you to use the iPad as a smooth scrolling professional teleprompter		Digital media	P1 / S0
Sketcher HD	Large etch-a-sketch app.	<ul style="list-style-type: none"> Used for fun, extra time or as an art lesson Fun to draw with, hard to do. 	Drawing	P1 / S0
Jam Pad	Digital music maker.	<ul style="list-style-type: none"> Create compositions Fun and really easy to use. 	Music	P0 / S2
Virtuoso	This piano app allows the user to play the piano using different key configurations. Has a keyboard that can be played individually or as a duet.	<ul style="list-style-type: none"> Students used this app during music classes and during group work when creating their own Digital Media examples. Great for introducing the key board 	Music Digital media	P0 / S2
Adobe Ideas	Digital Sketchbook		Drawing	P0 / S1
Air Guitar	This app allows the user to play the strings of a guitar.	<ul style="list-style-type: none"> Students used this app when investigating how to handle and operate the iPad and during group work when creating their own Digital Media examples. 	Digital media	P0 / S1
Beatwave	Music generator		Music	P0 / S1
Draw	This app provides a platform for drawing using fingers. The user would select a colour and trace what they wanted to draw in the space provided.	<ul style="list-style-type: none"> This app was used during year 7 DT classes to assist students to draw their storyboards for their practical projects. Once students had completed their storyboard they would take a screen shot of their work so that it could be downloaded and used by their group members. 	Digital media	P0 / S1

eTuner	This app is an electronic tuner that facilitates the tuning of instruments against multiple scales.	<ul style="list-style-type: none"> This app was used during musical practical lessons to assist in the tuning of various instruments 	Music	P0 / S1
For Score		<ul style="list-style-type: none"> A tool for very advanced piano players Has lots of Classical and Romantic scores. 	Music	P0 / S1
Glee App	It records you while you sing with the <i>Glee</i> choir with you as the lead vocalist and saves it for you to listen to (and improve on). You can send it off around the world and people rate it! It corrects your pitch and is very much like <i>Guitar Hero</i> as you can see the pitch levels of high, medium and low. The words come up and are highlighted. It also has a tutorial to show you how to use it.	<ul style="list-style-type: none"> It has a clear sound The students really liked this app, but in some ways it is like a glorified karaoke machine. 	Music	P0 / S1
Graffiti Draw	Collection of 2D, 3D and 4D interactive graphing examples		Maths Drawing	P0 / S1
Graphbook	Interactive graphing examples		Drawing Maths	P0 / S1
GrooveMaker	Create music tracks like a DJ.		Music	P0 / S1
I Am Symphony	This has really nice musical sounds where you can move instruments around and hear different parts of the orchestra. You can add in <i>Timpani</i> when you want. You can create new sections.	<ul style="list-style-type: none"> In terms of educational value it helps you to hear the Symphony and its music and arrange it at a very basic level. 	Music	P0 / S1
I-bone	Trombone practice app		Music	P0 / S1
Idea Sketch	Drawing MindMaps, concept maps, flow charts and convert to text outlines.		Research Digital media	P0 / S1
i-Real Book	Has thousands of charts you can play on guitar and piano		Music	P0 / S1
i-Sequence lite		<ul style="list-style-type: none"> This app was quite difficult to use 	Music	P0 / S1
Nota		<ul style="list-style-type: none"> This is excellent for music notation testing and has a quiz and marks students. 	Music	P0 / S1
Note Goal		<ul style="list-style-type: none"> Recommended for testing music notation reading 	Music	P0 / S1
Orchestra II	A beautiful app and interactively shows the student the layout of the orchestra, it gives a detailed history and fact sheet (beautifully presented) on each instrument as well as plays the instrument for you. You can hear each section play, to learn the unique tone of each instrument and family.	<ul style="list-style-type: none"> Despite it being great for learning about the instruments and their sounds, there is nothing further to do on this app once you've listened and watched eg. quizzes or educational games. It does have some really beautiful music on it. 	Music	P0 / S1
PhotoPad	Photo editing		Photos	P0 / S1
PollDaddy	Design and create polls and surveys		Research	P0 / S1
Popplet Lite	Sharing visual ideas, a place to collect and curate ideas		Research Collaboration	P0 / S1

Pro Keys	Multi-instrumental polyphonic keyboard and drum pad		Music	P0 / S1
Reel Director	Video editing		Video	P0 / S1
Saxonotes	Clarinet reach and fingerings	<ul style="list-style-type: none"> Has a finger chart that helps match the correct sound and fingers 	Music	P0 / S1
Six Strings	Electric and acoustic guitar, ukulele and steel drum		Music	P0 / S1
Strip design	Create Comic Strips		Drawing Writing	P0 / S1
Ultimate Guitar	Users can choose songs and transpose them into an easier key to play them.	<ul style="list-style-type: none"> Helps you learn the chords and tune your instrument 	Music	P0 / S1

READING & E-BOOKS				
Toy Story	Interactive storybook that reads out the story, highlights text as it reads, includes music, colourful pictures, painting and you can record yourself reading the story and play back.	<ul style="list-style-type: none"> Excellent App Year 6 read the stories to their buddies. Used in literacy groups as a reading/talking and listening activity Used during our silent reading program to assist lower ability readers to maintain their engagement during the reading time. Children used stories for reading and sharing. Teachers made changes to activities to suit the needs of their Literacy groups, eg editing tasks, vocabulary work 	Books	P5 / S1
Alice in Wonderland	Interactive storybook. Students could swing the iPad to make images and pictures move.	<ul style="list-style-type: none"> Good Students liked how you could move pictures, but it was a long story and it should read for you. 	Books	P2 / S2
iBooks	This app is a great place to download books and store them in a "library".	<ul style="list-style-type: none"> This app had Winnie-the-Pooh, which the children felt was a nice story 	Books	P2 / S1
How to Train Your Dragon	Interactive storybook with automatic navigation and narration which make it incredibly simple to use. Includes character audio, automatic or manual page turn, highlighted text helps beginning readers make associations between the words they hear and see	<ul style="list-style-type: none"> Great choice as a book for silent reading or in Menu Board time. Good book to read on the iPad with great graphics and the text appears and highlights as it is read. 	Books English Reading	P2 / S0
iReading by Apple Tree Books	Titles: The Lion and the Mouse, Little Horse.	<ul style="list-style-type: none"> Fully illustrated and interactive stories including well-known classics and original tales. 	Books	P2 / S0
Jack and the Beanstalk	Interactive storybook that reads out the story, highlights text as it reads, includes colourful pictures and you can click on characters to hear what they're thinking or play games.	<ul style="list-style-type: none"> Used all books as part of Silent reading time, in menu board or to read to Kindergarten or Year 2 students. Used extensively in our fairy tale unit 	Books	P2 / S0

Story Chimes	A collection of stories designed to immerse students in the sights and sounds of interactive tales. Children can read the text or have the text read to them. Titles: The Frog and the Prince, Red Shoes, Lucky Chuck, 3 Pigs, Cinderella	<ul style="list-style-type: none"> • Can read the text or have the text read to them. • Children loved the variety of pictures which have promoted further discussions about the story • Good for oral language 	Books	P2 / S0
3 Little Pigs	Interactive storybook that reads the story to you.	<ul style="list-style-type: none"> • It was a bit boring and not as interactive as some others. 	Books	P1 / S0
Cat in the Hat	Interactive version of Dr Seuss's story.	<ul style="list-style-type: none"> • Children can read on their own, listen to and interact with the pictures. • Prompted interest in other Dr Seuss books 	Reading	P1 / S0
Green Eggs and Ham Book	Interactive storybook that reads to you. You can highlight key phrases and click on characters to name them.	<ul style="list-style-type: none"> • Used as part of Silent reading time, in menu board or to read to Kindergarten or Year 2 students. • Worked on this story in a staff meeting focus on writing. 	Books	P1 / S0
Grimm's Rumpelstiltskin pop up	Read the text then move the pop ups		Books Reading	P1 / S0
Hairy Maclary	Interactive story.	<ul style="list-style-type: none"> • Many opportunities for the reader to interact 	Books	P1 / S0
Henny Penny	Animated story of Henny Penny		Reading	P1 / S0
Logan Lite	An interactive story. This is not the full version of the story but allows students to write an ending.		Books	P1 / S0
Mee genius	Small range of stories to listen to	<ul style="list-style-type: none"> • Great to listen to and share stories with a partner. • Some fairy tales available • Used for retellings 	Books	P1 / S0
Monkey Business	An interactive story with the ability to record voiceovers and paint scenes.		Books	P1 / S0
Pedlar Lady	Good story with moving pictures. It includes sound effects and detailed graphics. The text also appears on each page for students to follow.		Books	P1 / S0
Read ME Stories	New story book every day		Reading	P1 / S0
Shrek Comics	The latest Shrek movie in comic book format.	<ul style="list-style-type: none"> • Students enjoyed reading these as a different choice of book in silent reading time. 	Books	P1 / S0
The Story Mouse	The Billy Goats Gruff. A collection of virtual books with audio, illustrations and text. Available books include popular fairytales.		Books	P1 / S0
The Wrong Side of the Bed	Simple story that can be viewed in 2D or 3D.	<ul style="list-style-type: none"> • A fun story to listen to or read- many of our struggling readers enjoyed this. • Good illustrations and sound 	Books	P1 / S0
Wattpad	App to store purchased or free downloaded books.	<ul style="list-style-type: none"> • Not all free books were appropriate for children 	Books	P1 / S0

Zoo You Later-Monkey Business	A series of stories about true animal escapes. Students can run their fingers over the text to hear the story and touch any word to hear it said or spelt. Students can colour in the book and they can record themselves as well.	<ul style="list-style-type: none"> • Great choice as a book for silent reading or in Menu Board time. • It's great fun and helps with early learning and literacy development. Students can even explore other languages and have loads of fun while they do it. 	Books	P1 / S0
Amazon F	App for accessing e-books, including books with audio component.	<ul style="list-style-type: none"> • Constructing meaning from text, finding information, identifying information, sequencing, concluding, summary and inference, identifying cause and effect, identifying fact and opinion, identifying point of view and purpose, finding similarities/differences 	Books	P0 / S1
Jester's Riddle	Children's book including riddles, puzzles and word games		Books Reading	P0 / S1
Kindle	Amazon Kindle for e-books		Books	P0 / S1
Marvel	Comic books from Marvel		Books	P0 / S1
Shakespeare	Complete Works of Shakespeare		Books English	P0 / S1
Stanza	App contains downloaded books.	<ul style="list-style-type: none"> • Our students read these e-books during our silent reading time. 	Books	P0 / S1
Twilight Lite	Graphic novel of Twilight		Books	P0 / S1
GAMES				
Ball & Maze	Rolling the ball through the maze. Users found it good, but hard and frustrating!	<ul style="list-style-type: none"> • Used for fun reward time. 	Concentration	P1 / S0
Brain App XL	Brain training games and activities, multiple choice.	<ul style="list-style-type: none"> • Users enjoyed this and found it challenging • Used in Maths and free time. 	Brain activities	P1 / S0
Brain pop	Short animated clips followed by quizzes	<ul style="list-style-type: none"> • Interesting and different way to learn about particular topics, and to check comprehension 	Comprehension	P1 / S0
Chess	Chess for single or pairs	<ul style="list-style-type: none"> • Games at lunch time • Children learnt to play or practiced strategies 	Concentration	P1 / S0
Dice	1-6 Giant dice	<ul style="list-style-type: none"> • Dice readily available were used in a number of different games and were also used in chance games 	Mathematics	P1 / S0
Doodle Jump	Great game where you move the iPad to help the character bounce on different steps without falling off. Can be tricky and frustrating!	<ul style="list-style-type: none"> • Used for fun reward time. 	Concentration	P1 / S0
Farm Flip	Fun and simple memory game using farm animals	<ul style="list-style-type: none"> • Simple game children enjoyed while learning about the farm 	Memory	P1 / S0
Fluid	Relaxing water scene with music	<ul style="list-style-type: none"> • Was popular and quite addictive and promoted lots of conversation and investigation 	Investigation	P1 / S0
Glass Tower	Users need to use strategies before making towers.	<ul style="list-style-type: none"> • Users enjoyed this and found it challenging • Used in Maths and free time. 	Strategy	P1 / S0

High Five	A free app that involves you high-fiving the handprint on the screen. Not much fun or useful.	<ul style="list-style-type: none"> Used for fun reward time. 		P1 / S0
Matches	This App is a version of the memory game. There are 3 difficulty levels to choose from.	<ul style="list-style-type: none"> Children used this app to help with their memory. Children chose the level that was suitable for them 	Memory	P1 / S0
Maze	Maze game that users found too difficult.	<ul style="list-style-type: none"> Used for fun reward time. 	Strategy Concentration	P1 / S0
PACMAN	The <i>Atari</i> game where the Pacman has to eat the pellets before the aliens do.	<ul style="list-style-type: none"> Great simple game Use fingers or the control panel to move the Pacman High interest and great cooperation 	Concentration.	P1 / S0
Pocket pond	Relaxing water pond scene with fish	<ul style="list-style-type: none"> Children very interested in the life-like and interactive pictures Very calming 	Investigation	P1 / S0
Puzzles	Very easy puzzle pieces to fit in the correct holes. Good for little kids	<ul style="list-style-type: none"> Used for fun reward time. 	Concentration	P1 / S0
Scrabble	Board game on the <i>iPad</i>		Spelling Language	P1 / S0
Solitaire	Classic card game involving strategy. Fun for recreational use.	<ul style="list-style-type: none"> Used for fun reward time. 	Strategy	P1 / S0
Story Chimes - Games	Cinderella - Match	<ul style="list-style-type: none"> Fun games related to the Story Chime Tales that enhance comprehension. 	Comprehension	P1 / S0
Tic tac toe	Noughts and crosses game	<ul style="list-style-type: none"> Simple game which promoted strategic thinking 	Concentration Strategy	P1 / S0
Touch Hockey	Air hockey game that can be played against the <i>iPad</i> or in pairs	<ul style="list-style-type: none"> Excellent for concentration and encouraging team work 	Concentration	P1 / S0
Touch Maze	You need to look ahead, think of moves to work your way through many mazes.	<ul style="list-style-type: none"> Used for fun reward time. 	Strategy	P1 / S0
UniSudoku	Large games on interactive Sudoku puzzles.	<ul style="list-style-type: none"> Users enjoyed this and found it challenging Used in Maths and free time. 	Puzzles Logic	P1 / S0
WHG (World's Hardest Game)	Keep your Red Square away from the Blue Balls, pick up yellow balls, on your way to the Green Zone or you'll die.	<ul style="list-style-type: none"> Used for fun reward time. Requires lots of planning 	Strategy	P1 / S0
TOOLS FOR COMMUNICATION, PRESENTATION AND COLLABORATION				
Keynote	Powerpoint presentation creator app. Use the <i>iPad</i> to create <i>Keynote</i> presentations that can be projected on to the interactive white board. Slideshow presentation tool.	<ul style="list-style-type: none"> A great resource for preparing presentations for Integrated project tasks. 	Communication Presentation	P3 / S0
Chalkboard	Blank chalk board for writing	<ul style="list-style-type: none"> Used occasionally for spelling 	Spelling	P1 / S0
Flipboard	Sharing news, photos and updates on Facebook and Twitter		Collaboration Communication	P1 / S0

Voice Recorder	This App records sound and stores it for later use.	<ul style="list-style-type: none"> This app was used several times during class discussions and presentations so that the audio can be listened to again to recap the main points. 	Collaboration, Communication, Presentation	P1 / S0
Caster	Create and publish podcasts		Collaboration, Communication, Digital media	P0 / S1
Corkulous	Virtual Corkboard		Collaboration, Communication, Presentation	P0 / S1
iBrainstorm	This app provides the user with a platform to arrange their thoughts and ideas by editing and moving posted notes around on the pin board.	<ul style="list-style-type: none"> This app was used during year 7 DT classes to assist students to draw their storyboards for their practical projects. Allows the iPad to take the place of a whiteboard where the students can brainstorm as a group and save their responses. They can also make flowcharts. 	Storyboarding, digital media, Collaboration, Communication	P0 / S1
iFiles	This App has voice recording capabilities and allows the user to create text documents. This app is linked with the iFile website which provides a specific IP address for each iPad that has the iFile app. Once a file (audio, video, text or image) is saved or created in iFile app the file is uploaded to the iFile website. This allows for instant access to the files stored on the iPad by multiple users.	<ul style="list-style-type: none"> This App was used during DT and CL classes where students created and shared their own documents and Digital Media. 	Collaborating, Digital media	P0 / S1
Sticky notes	Take notes on Post-It style notes		Collaboration, Communication	P0 / S1
Touch Mouse	This app provides a touch screen interface for controlling the cursor and text entry areas on a linked computer. Once the computer and iPad are connected to the same Wi-Fi network the App automatically links with the computer and allows the operator to gain control of the cursor and text entry areas.	<ul style="list-style-type: none"> This App was used during teacher and student-directed class presentations to allow for the audience to focus on the material presented not the presenter. 	Communication, Presentation	P0 / S1
Voice Changer	This App allows the user to record their voice and manipulate it based on several pre-set options to distort the output.	<ul style="list-style-type: none"> This App was used during DT lessons to assist students to understand audio as an element of Digital Media and how it can be edited to change the effect of the sound produced. 	Digital media	P0 / S1

Appendix 3

Major Project Activities (summarized in Table 5)*Major Project Activity (MPA) Frequency by NETS Reference (Section 2 – Qs 2 & 3)*

The table shows the frequency with which participant schools used iPads in their learning as a tool for the identified major project activities. The *Activity* was identified in section 2, questions 2 and 3 in the survey instruments (appendices 6 and 7); the *NETS Reference* refers to the potential of the activity to allow demonstration of the identified standard to some degree²³; *Frequency Raw Score* refers to the number of teacher responses identifying the activity as having occurred at their school in the pilot; *Frequency %* refers to the percentage of times the cohort identified that activity as having occurred.

Activity	NETS Reference	Frequency Pre-pilot		Frequency Post-pilot	
		Raw score	% of total responses	Raw score	% of total responses
Reading (Q3 – Reading)	SS 3,4	15/1/16	93.8%	11/1x11	100%
Access information (Q2 – improve access; Q3 – web access)	SS 3	28/2/16	87.5%	19/2x11	86.4%
Content creation (Q3 – content creation)	SS 1,4,5	11/1/16	68.8%	5/1x11	45.5%
Virtual learning with Apps (Q3 – simulations; access virtual learning opportunities)	SS 1,4	20/2/16	62.5%	14/2x11	63.6%
Personal study (Q2 - individual work; Q3 - note-taking, studying)	SS 3-6	26/3/16	54.2%	10/3x11	20.8%
Communication & Collaboration (Q2 – collaborative work, small group session, outside classroom, expert; Q3 – communication)	SS 2,5,6	50/5/16	62.5%	35/5/11	63.6%
Whole of Class (Q2 – whole of class activities)	NA	15/1/16	93.8	10/1/11	90.9%

Table 8: Expected and actual frequency of iPad use in the identified major pilot activities.

²³ The pilot did not measure this degree – it only studied the potential for it to allow participants to demonstrate the standard.

Appendix 4

Ranking ISTE.Nets Standards by iPad Use (summarized in Table 6)

NETS Reference by Major Activity Frequencies (Post-pilot Survey Section 2 – Qs 2 & 3)

The table is derived from Table 4 and shows the total percentage of all pilot activities spent on developing the identified ISTE.Nets standard. The 7th Major Project Activity (MPA) of “Whole of Class” from Table 4 was not used for these calculations, as there was no Student Standard associated with it.

ISTE.Nets Student Standards (SS)	MPAs	Number of MPAs contributing to the standard	% of total activities contributing to the standard	% of respondents who used the iPad for these activities	Unadjusted % of all iPad pilot activity devoted to the standard	Adjusted %
Notes to explain calculations →	Showing post-pilot %'s from column 5 in Table 4.	A= Count the number of times that the SS is shown in column 2 of Table 4	B= Convert A to a % of the total number of MPAs ie. 6	C= From column 2, average of post-pilot %'s relating to the activities	D= B x C / 100 ie. total % of the pilot spent on each standard	E= D*100/137.4
SS4 Critical Thinking, Problem solving, Decision Making	<ul style="list-style-type: none"> Reading (Q3) – 100% Content creation (Q3) – 45.5% Virtual learning with Apps (Q3 – simulations; access virtual learning opportunities) – 63.6% Personal study (Q2 - individual work; Q3 - note-taking, studying) – 20.8% 	4	$4/6*100=$ 66.7%	$(100+45.5+63.6+20.8)/4=$ 57.5%	$(66.7*57.5)/100=$ 38.3%	27.9%
SS3 Research & Information Fluency	<ul style="list-style-type: none"> Reading (Q3) – 100% Access information (Q2 – improve access; Q3 – web access) – 86.4% Personal study (Q2 - individual work; Q3 - note-taking, studying) – 20.8% 	3	$3/6*100=$ 50.0%	$(100+86.4+20.8)/3=$ 69.1%	$(50*69.1)/100=$ 34.5%	25.1%
SS5 Digital Citizenship	<ul style="list-style-type: none"> Content creation (Q3) – 45.5% Personal study (Q2 - individual work; Q3 - note-taking, studying) – 20.8% Communication (Q2 – collaborative work, outside classroom, expert; Q3 – communication) – 63.6% 	3	$3/6*100=$ 50.0%	$(45.5+20.8+63.6)/3=$ 43.3%	$(50*43.3)/100=$ 21.7%	15.8%
SS1 Creativity and Innovation	<ul style="list-style-type: none"> Content creation – 45.5% Virtual learning with Apps – 63.6% 	2	$2/6*100=$ 33.3%	$(45.5+63.6)/2=$ 54.6%	$(33.3*54.6)/100=$ 18.2%	13.2%
SS6 Technology Operations & Concepts	<ul style="list-style-type: none"> Personal study (Q2 - individual work; Q3 - note-taking, studying) – 20.8% Communication (Q2 – collaborative work, outside classroom, expert; Q3 – communication) - 63.6% 	2	$2/6*100=$ 33.3%	$(20.8+63.6)/2=$ 42.2%	$(33.3*42.2)/100=$ 14.1%	10.3%
SS2 Communication & Collaboration	<ul style="list-style-type: none"> Communication (Q2 – collaborative work, outside classroom, expert; Q3 – communication) – 63.6% 	1	$1/6*100=$ 16.7%	$63.6/1=$ 63.6%	$(16.7*63.6)/100=$ 10.6%	7.7%
					154.3	100

Table 9: Percentage of iPad usage devoted to the achievement of the ISTE.Nets Standards.

Appendix 5

Challenges

Predicted Challenge	Pre-pilot	Actual Challenge	Post-pilot
Distraction to self & others	88.2%	Time taken to manage	81.8%
Lack of ability to multitask	43.8%	Sync'ing the iPads	54.5%
Time taken to manage	37.5%	Connectivity	45.5%
Sync'ing the iPads	37.5%	Distraction to self & others	27.3%
Connectivity	37.5%	Lack of ability to multitask	18.2%
Navigation of menus	6.3%	Navigation of menus	0%
Other comments: <ul style="list-style-type: none"> • Unable to connect to interactive whiteboard limited its use as teaching demonstration tool • Limited number of Apps suitable to all levels – many were either too hard or too easy 			
Table 10: Predicted and actual challenges for teacher management during the pilot – Data Set 1 (sections 2 and 4).			

Appendix 6

Pre-pilot Survey

Prompt	Response	Survey tool
Section 1: Demographics		
School name:	<schoolname>	Drop-down list
Name of survey respondent:	<survey respondent>	Free response
Indicate the Stage area your pilot will work with:	<ul style="list-style-type: none"> • Early Stage 1 • Stage 1 • Stage 2 • Stage 3 • Stage 4 • Stage 5 	Drop-down list
Section 2: Classroom Practices		
Select all those technologies you use with your classes now (choose all that apply):	<ul style="list-style-type: none"> • Desktop computer • Laptop computer • iPod • iTouch • Mobile phone • Games devices • Special needs access device • iPad • IWB • Other – please specify... 	List with multi-selectable radio buttons
Select all those activities you use the technologies for with your classes now (choose all that apply):	<ul style="list-style-type: none"> • Individual work • Collaborative work • Small group session • Whole-of-class activities • Communication outside your classroom • Communicate with outside expert • To improve access for all students to information • Other – please specify... 	List with multi-selectable radio buttons

What activities do you think that the <i>iPad</i> will be used for in your classroom (choose all that apply):	<ul style="list-style-type: none"> • Note-taking • Studying • Reading • Web-access • Simulation • Access virtual learning opportunities • Content creation • Communication • Other – please specify... 	List with multi-selectable radio buttons
What issues or challenges do you see in the use of <i>iPads</i> in the classroom (choose all that apply):	<ul style="list-style-type: none"> • Distraction to self and others • Connectivity • Lack of ability to multi-task • Syncing the <i>iPads</i> • Time of management • Navigating menus • Other – please specify... 	List with multi-selectable radio buttons
Section 3: Skills		
To what extent does your current skill level in the use of technologies-for-learning match student learning demands?	<ul style="list-style-type: none"> • Not at all • Limited • Unsure • Somewhat • Closely match 	Likert scale
Section 4: Sustainability of Practice		
To what extent are you confident that using technologies makes a difference to learning?	<ul style="list-style-type: none"> • Not confident • Limited • Neutral • Somewhat • Very confident 	Likert scale
To what extent are you confident in using your learnings to enhance and improve learning experiences with your students?	<ul style="list-style-type: none"> • Not at all • Limited • Unsure • Somewhat • Very confident 	Likert scale
Table 11: Pre-pilot survey completed on-line by participants. The survey was created using the tool called <i>Survey Monkey</i> .		

Appendix 7

Post-pilot Survey

Prompt	Response	Survey tool
Section 1: Demographics		
School name:	<schoolname>	Drop-down list
Name of survey respondent:	<survey respondent>	Free response
Indicate the Stage area your pilot worked with:	<ul style="list-style-type: none"> • Early Stage 1 • Stage 1 • Stage 2 • Stage 3 • Stage 4 • Stage 5 	Drop-down list
Section 2: Classroom Practices		
Select all those technologies you use with your classes now (choose all that apply):	<ul style="list-style-type: none"> • Desktop computer • Laptop computer • iPod • iTouch • Mobile phone • Games devices • Special needs access device • iPad • IWB • Other – please specify... 	List with multi-selectable radio buttons
Select all those activities you use the technologies for with your classes now (choose all that apply):	<ul style="list-style-type: none"> • Individual work • Collaborative work • Small group session • Whole-of-class activities • Communication outside your classroom • Communicate with outside expert • To improve access for all students to information • Other – please specify... 	List with multi-selectable radio buttons

What activities during the pilot program was the <i>iPad</i> used for in your classroom (choose all that apply)?	<ul style="list-style-type: none"> • Note-taking • Studying • Reading • Web-access • Simulation • Access virtual learning opportunities • Content creation • Communication • Other – please specify... 	List with multi-selectable radio buttons
What issues or challenges did you encounter in the use of <i>iPads</i> in the classroom (choose all that apply):	<ul style="list-style-type: none"> • Distraction to self and others • Connectivity • Lack of ability to multi-task • Syncing the <i>iPads</i> • Time of management • Navigating menus • Other – please specify... 	List with multi-selectable radio buttons
Section 3: Skills		
To what extent does your current skill level in the use of technologies-for-learning match student learning demands?	<ul style="list-style-type: none"> • Not at all • Limited • Unsure • Somewhat • Closely match 	Likert scale
Section 4: Sustainability of Practice		
To what extent are you confident that using technologies makes a difference to learning?	<ul style="list-style-type: none"> • Not confident • Limited • Neutral • Somewhat • Very confident 	Likert scale
To what extent are you confident in using your learnings to enhance and improve learning experiences with your students?	<ul style="list-style-type: none"> • Not at all • Limited • Unsure • Somewhat • Very confident 	Likert scale
Table 12: Post-pilot survey completed on-line by participants. The survey was created using the tool called <i>Survey Monkey</i> .		